Final Report

Food and Agriculture Organization
of the United Nations

Study of Poultry Value Chain in Seven Avian Influenza High Risk Districts of Nepal with Special Focus on the Risk of Disease Transmission

Food and Agriculture Organization
Emergency Center for Transboundary Animal Diseases
Hariharbhawan, Lalitpur
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Acronyms and Abbreviations

AE	Avian Encephalomyelitis
AI	Avian Influenza
AIB/IB	Avian Infectious Bronchitis / Infectious Bronchitis
AQCP/ AQO	Animal Quarantaine Check Post/ Animal Quarantaine Office
BYP	Back Yard Poultry
COP	Code of Practice
CRD	Chronic Respiratory Disease
DAH	Directorate of Animal Health
DG	Director General
DLS	Department of Livestock Services
DOC	Day-old-chick
ECTAD	Emergency Center for Transboundary Animal Diseases
EU	European Union
FAO	Food and Agriculture Organization of the United Nations
FGD	Focus Group Discussion
HPAI	Highly Pathogenic Avian Influenza
HPAIV	Highly Pathogenic Avian Influenza Virus
IBD	Infectious Bursal Disease
ICT	Information and Communication Technology
KII	Key Informants interview
Km	Kilometer
LPAI	Low Pathogenic Avian Influenza
LTO	Lead Technical Officer
MD	Marek's Disease
MoAD	Ministry of Agricultural Development
MoALD	Ministry of Agriculture and Livestock Development
MT	Metric Ton
N	Number
ND	New Castle Disease
NPD	National Program Director
NVPL	National Vaccine Production Laboratory
OIE	World Organization for Animal Health
Rs.	Rupee
SMD	Society For Management and Development
TIA	Tribhuwan International Airport
TOR	Terms of reference
USAID	United State Agency for International Development
VEC/VES	Veterinary Epidemiology Center/Veterinary Epidemiology Section
VH and LSEC	Veterinary Hospital and Livestock Service Expert Center
VH	Veterinary Hospital
VSDRL	Veterinary Standards and Drug Regulatory Laboratory
WHO	World Health Organization

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Executive Summary

Poultry industry is a leading and fastest growing livestock industry in Nepal and contributes about 4% to the National Gross Domestic Product (GDP). Rural poultry contributes as much as 50% of the total production of the country and these poultry are rarely treated against any infectious disease. In many instances, the big commercial farms or hatcheries are in close proximity to rural poultry, and as such are in greater risk of exposure to diseases.

Poultry value chain in Nepal seems to be very complex due to traditional practice, socio-economic status, physical feature of the district, and long open cross-borders with neighbouring countries, particularly India. There are multiple points of entry for poultry and poultry products to enter into bordering districts. The prime cause for unrestricted two-way movement of poultry, products and feeds between the countries and in the bordering areas is the price differences. Very long Indo-Nepal open border and social network has favoured cross-border movement of poultry and poultry products. DOCs, poultry, poultry products, feed and manure move freely between the different districts as per the demand and price factors. Such unrestricted movement of these commodities have challenged all stakeholders involved in disease surveillance, diagnosis, prevention and control of the poultry diseases. Carrying of 1-2 live poultry as a gift by women along the border or across the border is also considered as another important factor for transfer of avian diseases in both countries.

In the present context, Nepal is suffering a great economic loss due to both zoonotic and other non-zoonotic infectious poultry diseases. Considering the first recorded human death from HPAI in April 2019 in Nepal, FAO (OSRO/NEP/401/USA), in close collaboration with the Department of Livestock Services and Ministry of Agricultural and Livestock Development, (DLS - MOALD) planned to conduct Poultry Value Chain study in seven high risks districts (Kathmandu, Lalitpur, Bhaktapur, Chitwan, Kaski, Jhapa and Sunsari) of Nepal. The overall objective of the study was to analyze the poultry sub-sector value chain and map the movements of poultry and poultry products showing links to identify the critical and risky points of poultry diseases transmission.

During the field study, Focus Group Discussion (FGD) and Key Informant Interview (KII) tools were utilised to collect field data from different stakeholders involved in the poultry value chain. The team visited some places to observe the actual situation in the high-risk districts for disease transmission through the movement of poultry, poultry products and other related materials.

The study identified poultry production status, common poultry diseases, feed industry, transportation system, district wise movement such as imports/collection and supply/export of live poultry, day-old- chicks, poultry products, feed, feed ingredients, live vaccine, manure, waste management/ disposal system as well as major entry and exit points in each of the seven districts. Poultry market points, marketing systems and trade volumes, slaughterhouse/ place, meat marketing, high risk areas due to informal movement and strategic locations were assessed as far as possible in all study districts. Efforts were made to

understand en-route transaction of the consignment. Problem faced by the stakeholders and their suggestions to improve the situation were also collected.

Poultry traders and farmers of the Kathmandu valley, Pokhara and Chitwan were more aware of poultry diseases and its transmission through the movement of live poultry and poultry products, though there were many shortfalls in practices of biosecurity, market management and record keeping. On the other hand, traders and farmers of Jhapa and Sunsari districts are found relatively less aware in knowledge, skill, attitude and practices on biosecurity, disease transmission, cross contamination, market management and record keeping aspects.

Exploration of internal trade routes and trade flow of poultry, poultry products, feed, feed ingredients and live poultry vaccines was conducted to its best. Study showed that entry and exit points are the same for all the commodities mentioned above. Movement of poultry, poultry products, feeds and manure were two-way within the country, which is determined by production volume, consumer's choice, demand-supply, price difference and cultural practices. As farmers and traders have not adopted proper record keeping, exact traded volume could not be determined.

Biosecurity in some big poultry farms and hatcheries were found satisfactory as compared to small hatcheries, small farms and feed industries. Very limited epidemiological information was collected during study period pertaining to the gap between three tier governments in the new federal system.

In brief, the study observed that lack of risk analysis, weak application of biosecurity measures at various levels, low level of awareness among the stakeholders, skills and knowledge in the stakeholders, monopolized pricing of the commodities, unorganized market and marketing, inadequate disease surveillance, weak inspection and certification system, insufficient skilled technical work force in the field and weak border control were the major constraints found in the poultry value chain.

Based on the findings of the study, recommendations made are: Ensuring effective field veterinary services; proper border control, inspection and certification services and their implementation as per SPS agreements through amendment of existing/ formulate new legal frameworks related to poultry production, transportation and marketing; discouraging or removing the poultry farms from the bordering line ; activate the veterinary inspectors to inspect/ monitor the activities of farms, hatcheries and other stakeholders involved in the poultry value chain; issue Veterinary Health Certificate only by the authorized person.

establishing clear line of command or coordination/collaboration mechanism among three tiers of government; preparing and updating preparedness plan, surveillance plans for the most dreadful poultry diseases and establishment of regular surveillance mechanisms; applying mitigation measures at identified critical control points to reduce the risk of disease transmission and economic loss due to movement of poultry and poultry products; strengthening of veterinary laboratories at local, provincials and central level; establishing farm registration system, record keeping and traceability system throughout the poultry value chain; application of risk management and biosecurity measures at all levels; establishment

of scientific and modern poultry markets, poultry slaughterhouses/ poultry processing plants at strategic locations; and enhancing capacity of key stakeholders on risk management, biosecurity, record keeping, slaughterhouse management, market management and consumers awareness program.

1. Introduction to the project

FAO, in close collaboration with the Department of Livestock Services and Ministry of Agricultural and Livestock Development, (DLS - MOALD) has focused primarily on providing emergency response to the disease through a global programme that supports global, regional and country level coordination, capacity building and development of strategic partnerships to progressively control and eliminate the infection and mitigate the risk of emergence of human pandemic influenza as well as economically important other poultry diseases.

Government of Nepal had requested FAO and technical partners to conduct a situation assessment of poultry value chain and associated poultry diseases including avian influenza (AI) to provide additional assistance in response to the critical situation in Nepal including regional aspects.

2. Introduction to the assignment

New Castle disease, Infectious Bursal Disease, Fowl Pox, Pullorum diseases are economically important diseases, whereas Highly Pathogenic Avian Influenza (HPAI generally H5N1), is a highly pathogenic poultry disease causing severe respiratory symptoms and deaths. Every year, thousands of poultry are affected by these diseases in Nepal. Among the zoonotic diseases, HPAI is easily transmitted to susceptible birds as well as human. WHO has reported 860 human deaths due to this disease, till date and Nepal has also reported one human death in the month of April 2019, marking its first human fatality.

Poultry industry is fast growing in Nepal and contributes about 4% to the National Gross Domestic Product. It is a leading livestock industry in the country and follows an increasing trend (DLS and MOLD, 2017) (see Annex- 1and 1a). Although poultry is being reared throughout the country, commercial poultry farming is more popular in urban and peri-urban areas. With the growth and expansion of commercial poultry farming, several endemic, emerging and re-emerging diseases are posing the threats to this sector in the country. More than 249 outbreaks of Highly Pathogenic Avian Influenza (HPAI, H5N1 and H5N8) have been recorded since its first incursion in January 2009. A total of 2,092,156 poultry have been destroyed till date as a part of control and containment program which causes a serious economic loss in Nepal (OIE 2009 to 2019) (see Annex- 2). Change in the clade of the virus gradually from 2.2 in 2009, 2.2 and 2.3.2 in 2010, 2.3.2.1 and 2.3.2.1a from 2011 to 2014 to 2.3.2.1a in 2017 in Nepal indicates the high sensitivity and mutagenicity of this virus (FAO, 2015) (Annex- 2). Besides, 2.3.4.4 clade of H5N8 has been identified in wild captive birds around Sunsari district in 2017 (OIE 2009 to 2019 and DLS 2019).

Gangetic plain is considered as the one of the most vulnerable areas due to high population (human and livestock/ poultry) density, which may play a great role in emergence of this particular virus in the wildlife as well as for their mutation. Nepal also falls under the Indo- Gangatic plain. In Nepalese context, about 4 % of the poultry are raised in semi-

commercial and rural system where biosecurity measures /good husbandry practice are poor and many of poultry farmers have limited knowledge on biosecurity. As such, spill over of the mutated virus from the wildlife to the human and domestic animal population may pose pandemic threat. Besides, improper farm biosecurity, informal trade (Annex -3) fluctuation in market price and movement of poultry and poultry products are some of the factors responsible for spreading poultry diseases within the country and across the borders.

3. Importance of present study

Livestock Value Chain study was conducted by Society for Management and Development (SMD) in 2014 covering Jhapa, Morang, Dhanusha, Parsa, Rupandehi and Banke districts under the technical and financial supports from FAO. That study excluded poultry sector despite it being one of the raising sub-sectors in Nepal. Because animal value chains can act as a driver of disease and it is influenced by different factors in the production and marketing system ((FAO/ECTAD, 2014).), understanding of poultry value chain (internal and across the border) with mapping of the movements of poultry and poultry products would be helpful to identify strategic locations for intervention and to take policy decisions for the application of an appropriate prevention and control measures, which ultimately would help to reduce the risk of spread of causative agents. In this context, conduction of poultry value chain study in high-risk districts for HPAI and other poultry disease transmission Jhapa, Sunsari, Chitwan, Kaski, Kathmandu, Lalitpur and Bhaktapur districts would be a key tool in understanding and resolving the above-mentioned constraints in Nepalese poultry sector.

4. Scope of the study

Considering the sensitivity, disease transmission and outbreaks of the poultry diseases, seven districts of the country mentioned above have been selected to study the overall poultry value chain in these districts focusing on the movement of poultry, poultry products in terms of types and volumes both in and out of the study districts, trading/movement routes, en - route supply and destination and diseases transmission including some bio-security practices adopted to reduce the risk of disease transmission. A poultry value chain expert was hired to conduct this study. The TOR of the expert is given in Annex-14.

5. Objectives of the study

The overall objective of the study is to analyze the poultry sub-sector value chain and map the movements of poultry and poultry products showing links considering the critical and risky points of poultry diseases transmission in the study districts.

Specific objectives:

- Analyze the poultry sub-sector value chain and map the movement of poultry and poultry products showing links considering the critical and risky points of poultry diseases;
- Identify the internal trade routes and trade flow system of chicks, broiler, layers (spent hen), backyard chicken (if any) as well as ducks, eggs and poultry meat from production/entry points (where appropriate) through different points of the value chain, market places and marketing systems;
- Identify the factors involved in the value chain and biosecurity en-route and consignments that are mixed or split en-route or other factors responsible for the spread of AI including other zoonotic and high economic impact poultry diseases;
- Identify the market points, marketing systems and trade volumes, considering that poultry birds and ducks may be mixed en-route;
- Collect timescale data (on the frequency of 3 month) on poultry transportation from the production/entry to different places;
- Collect information on the process and points of inspection of poultry and ducks that may carry the disease; and
- Suggest how risk reduction measures may be most effectively applied at all levels from production/entry points to trade routes and processing units, wholesalers, retailers and consumers.

6. Methodology

The study was initiated by:

- Reviewing of project documents and planned activities
- Reviewing of the literatures related to disease outbreak situation and its impact, designing of the study in the districts, border and live market
- Developing of suitable formats required to collect information for fulfilling the study objectives
- Preparing inception report and sharing with DLS authority in an inception meeting and LTO
- Collecting of value chain data by organizing interviews with Key Informants (KI) and focus group discussions (FGD) with different value chain actors (namely, government organizations like AQCP, border security, customs, Veterinary Hospital and LSEC; selected farmers, entrepreneurs (hatcheries, feed millers, egg association, chicks suppliers, agro-vets, slaughterhouse/ slaughtering place, Commodity Federation and associations, vets, transporters , traders and livestock markets) in all seven districts, wherever applicable, using pre-designed formats (Annex - 13).
- A total of 28 -35 people (Annex- 10) participated from each district. Based on their involvement in the industries, they were divided into 3 sub- groups as Trader/ entrepreneurs, farmers, and officials/ security personnel and others. Field programs were organized by country project team where appropriate. In this study 323 people including security and government officials participated (Table -1).

- Analyzing the data and preparing a draft report for discussion with government stakeholders (which include participation from poultry sector). For mapping of value chain data (Origin to final destination – "to and fro"), an IT expert was provided by FAO as a Consultant.

Table 1: Category of Participants attending FGD and KII under Poultry Value Chain Study

District	Activity	Traders	Farmers	KI and security	Project Staff	Total participants
Kathmandu	FGD Traders	13	0	4	5	22
	FGD Farmers	0	10	4	3	17
	KII	0	0	12	4	16
Bhaktapur	FGD Traders	10	0	2	3	15
	FGD Farmers	0	10	2	3	15
	KII	0	0	9	4	13
Lalitpur	FGD Traders	6	0	2	6	14
	FGD Farmers	0	9	2	6	17
	KII	0	0	11	6	17
Chitwan	FGD Traders	10	0	2	5	17
	FGD Farmers	0	10	2	5	17
	KII	0	0	9	5	14
Kaski	FGD Traders	9	0	3	5	17
	FGD Farmers	0	7	2	5	14
	KII	0	0	13	5	15
Jhapa	FGD Traders	7	0	2	2	11
	FGD Farmers	0	10	2	2	14
	KII	0	0	13	2	15
Sunasari	FGD Traders	10	0	2	2	14
	FGD Farmers	0	9	2	2	13
	KII	0	0	14	2	16
	Total	**65**	**65**	**114**	**82**	**323**

7. Field activities

Field activities were conducted to collect field data as given in Table - 2.

Table 2: Field Program for Poultry Value Chain study

S.N.	Date	District	Venue
1	19- 20 Jul 2019 (Shravan 3 and 4, 2076)	Kathmandu	VH and LSEC Contact Office, Budhanilakantha, Chapali
2	23 - 24 Jul 2019 (Shravan 07 and 08, 2076)	Bhaktapur	Hotel Paradise Food Land, Sallaghari
3	28- 29 Jul 2019 (Shravan 12 and 13, 2076)	Lalitpur	Vet Hospital and LSEC, Lagankhel
4	4- 5 Nov 2019 (Kartik 18 and 19, 2076)	Chitwan	National Avian Disease Investigation Laboratory, Bharatpur
5	19- 20 Nov 2019 (Mangsir 3 and 4, 2076)	Kaski	Veterinary Laboratory, Pokhara
6	5- 6 Dec 2019 (Mangsir 19 and 20, 2076)	Jhapa	Vet Hospital and LSEC, Jhapa
7	9- 10 Dec 2019 (Mangsir 23 and 24, 2076)	Sunsari	Vet Hospital and LSEC, Jhapa

8. Limitations of the study

This study was presumed to cover the areas of poultry value chain in seven avian influenza high risk districts of Nepal with special focus on the risk of disease transmission. However, due to unavailability of fund and time constraint for field activities, only three districts (Kathmandu, Lalitpur and Bhaktapur) were covered in the first phase (July to August 2019) while remaining four districts (Chitwan, Kaski, Jhapa and Sunsari) were covered in the second phase of the mission (November 2019 - January 2020). Besides, volume of the consignment and en-route drop of the poultry, DOC, eggs and feed was expected to be recorded for analysis, but data was not made available by the stakeholders due to lack of actual recording system in the industry. Whatever data recorded during study was utilized for analysis.

9. Review of literatures

a. Review on policy and legal frameworks for the control of poultry diseases

Review of existing policies, plans, provisions and performance of veterinary services (PVS) gap analysis report of 2011 reveals the followings for further improvement of the poultry industry:

National Agriculture Policy, 2061 (2004)

Policy shows concern in mitigating production loss from diseases in livestock sector by strengthening quarantine and disease surveillance measures, besides other activities as livestock insurance and breed improvement.

Agri-business Promotion Policy, 2063 (2006)

The Agri-business Promotion Policy highlights diversification, commercialization and promotion of agriculture sector with private sector involvement in commercial farming, for transforming agriculture from subsistence level to commercial farming.

PVS Gap Analysis, 2011

The gap analysis report made below suggestions for the improvement of Veterinary System (VS):

a. The VS must conduct passive surveillance and report at the national level in compliance with OIE standards for most relevant diseases.

b. The VS must conduct active surveillance in compliance with scientific principles and OIE standards for some relevant diseases, apply it to all susceptible populations, update it regularly and report the results systematically.

c. The VS must implement prevention, control and eradication programmes for all relevant diseases but with scientific evaluation of their efficacy and efficiency of some programmes.

14th National Three-Year Plan

14th National three-year plan has emphasized on self-sufficiency, food safety, reduction of malnutrition, safe production, increase productivity and livestock production. Its strategies include:

a. Infrastructure development and improvement in livestock and poultry value chain for sustainable development

b. Climate resilience and development of environment friendly livestock and poultry industry

In the same plan, animal health working strategy number seven states that infrastructure will be developed to control Ranikhet and other poultry diseases; quality control of vaccine and feed supplement; control emergency management, compensation provision in case of HPAI; and create awareness on zoonotic diseases.

Roadmap of Ministry of Agriculture and Livestock Development

Clause number 16 states to increase in-country production of feed ingredients. Poultry Production Policy, 2011 is in place.

Agriculture Development Strategy, 2015 - 2035

In the Value Chain Development Program and Agriculture Value Chain Selection section, space for poultry development has been provided. A total of 15 agricultural commodities have been selected in which poultry ranks 8th.

Poultry production and trading related acts, regulation and standards

More than 10 acts, regulation, and standards are in place for poultry production, marketing and/ trading which are related to the movement control, slaughtering, export-

import of biologicals, production, hatcheries and control of confiscated chickens or birds.

Biosecurity measures to be applied

Biosecurity in the poultry farm is to prevent the flocks from microbial contamination, to reduce the antibiotic residues in the tissues and to protect the environment. Standard practice on biosecurity includes:

- Provision of fence / wall in the farm
- Provision of footbath, hand wash wheel-bath facilities
- Use of mask, apron or PPE and change clothes before and after entering or exiting from the poultry farm by the workers
- Use of potable water, proper housing facilities,
- Provision of proper ventilation
- Application of all- in and all-out system
- Provision for rodent and pest control in the farm
- At least 10-meter distance between two farms
- 1200 meter away from the highways
- Provision to control visitors in the farm and its record
- Record keeping (Treatment, vaccination, flock groups, antibiotic withdrawal period, etc.)
- Feeds and drugs procured only from the reliable source, etc.
- Application of other good practices

Nepalese standard is explained in article 6 (2) and schedule -13 of Commercial Poultry farm and Hatchery Operation Directives (Nirdeshika), 2071 BS.

b. Poultry production system DOC production

Backyard, semi-commercial and commercial poultry production system exists in Nepal, where the backyard/ rural poultry shares about 50 % (Sapkota **et al.**,2019) and rest is covered by semi-commercial and commercial poultry production system. Although Chitwan, Kathmandu and Pokhara are considered as the poultry hubs, this industry has expanded in almost all districts of the country, except high altitude districts.

Review on the poultry population and poultry products revealed that poultry population is in increasing trend with an average of 62226.08 thousand number per year (48469-72650 in 5 years) (Figure - 1). Similar trend has been observed in the meat production with an average production of 52392 MT per year (43360 - 60122 MT) and 118621 (87292 - 151227 ten thousand) egg production per year from 2013/14 to 2017/18 (Figure - 2).

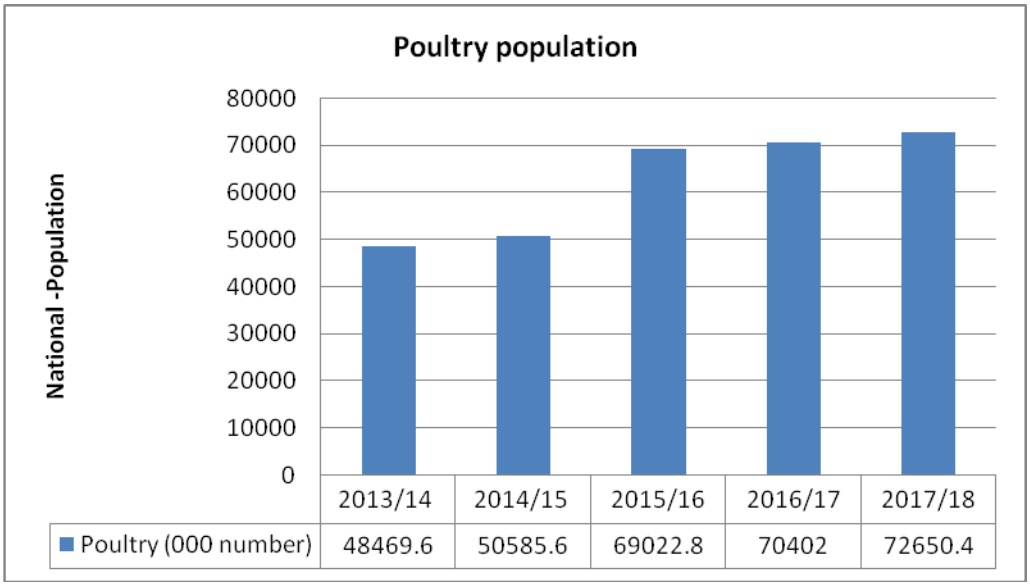


Figure 1: Poultry population (National)

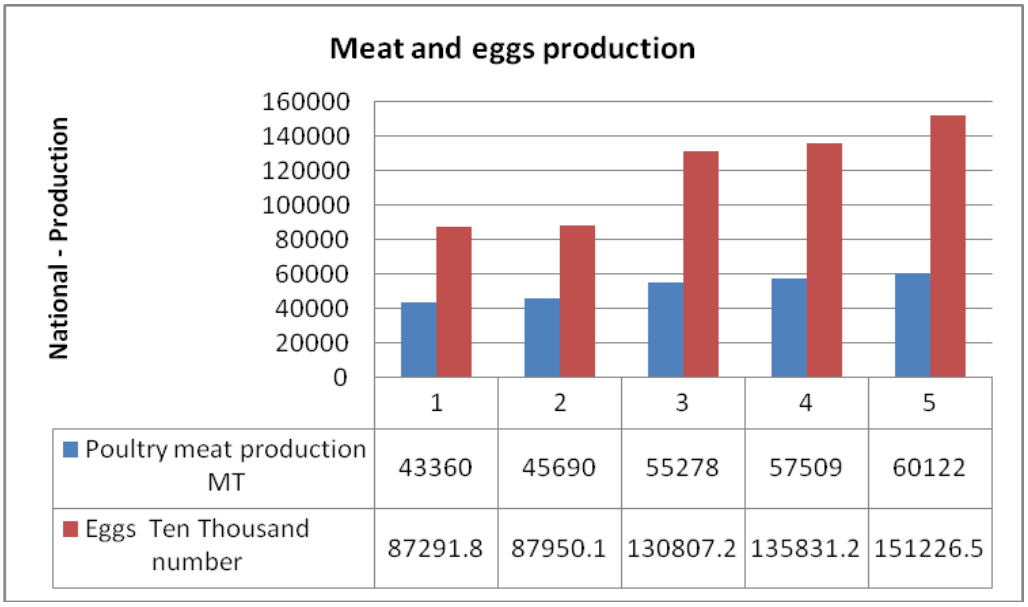


Figure 2: Poultry meat and eggs production (National)

DOC production: A total of 28 hatcheries are running in Kathmandu valley and producing 794- 815 thousand DOCs per week. Other 110 hatcheries (including backyard type) are running in the rest target districts. These are distributed in several districts of the country. Commercial poultry production covers about 55 % of total production in the country, where broiler industry is leading when compared to layers industry. Average commercial poultry production rounds off to be 82784 thousand per year and commercial poultry shares an average of 126.4 thousand MT meat per year (121.3 - 150.0 MT in 3 years) (Annex - 1)

c. Poultry production in the target districts

Commercial poultry production is practiced nationwide in Nepal. Poultry meat and egg production trend is in an increasing trend. The average population of poultry in Bhaktapur, Lalitpur and Kathmandu districts are approximately 1128, 14128 and 1392 thousand per year respectively, whereas the poultry meat production in these districts seemed to be 430, 1831 and 2159 MT per year respectively. Similarly, annual average egg production in Bhaktapur, Lalitpur and Kathmandu districts was found to be 22886, 17843 and 25576 thousand respectively. Further details of poultry population and production of seven target districts is presented in Annex - 3 and 4.

d. Poultry diseases including bird flu situation (Epidemiology, high risk areas, outbreak, clades of virus in Nepal, destruction of poultry during outbreak)

HPAI, New Castle Disease, Avian Infectious Bronchitis, Infectious Laryngo- tracheitis, Infectious Bursal Disease, Marek's Disease, Avian Encephalomyelitis, Avian Leucosis Complex, Duck Viral Hepatitis, Duck Viral Enteritis, Fowl Pox, Fowl Typhoid, Avian Tuberculosis, Fowl Cholera, Ornithosis and psittacosis, Pullorum Disease, Infectious Coryza, and Avian Salmonellosis have been reported in different classes of poultry in Nepal. Among them, HPAI, New Castle Disease, Infectious Bronchitis, Fowl Cholera, Fowl Pox, Fowl Typhoid, Infectious Bursal Disease, Marek's Disease, Pullorum Disease are the major poultry diseases causing economic losses. Besides, one human death from of HPAI H5N1, reported in April 2019, has aggravated the fear in the poultry industry and human population.

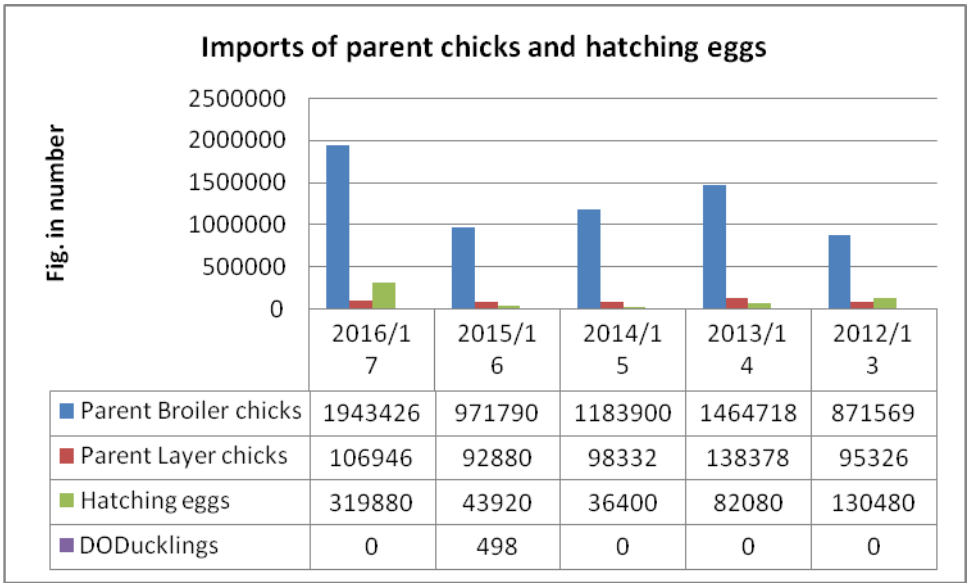
Regarding the outbreaks of poultry diseases, VEC, Kathmandu (2012 -2016) has reported several outbreaks of Fowl Pox, Pullorum, New Castle Disease, IBD and IB; although number of outbreaks seem to be in decreasing order (Annex - 2). Similarly, the first outbreak of HPAI was recorded at two places of Nepal in 2009. Since then, except in 2015 and 2016, outbreak of this disease has continued up to 2019, when a total of 12 outbreaks had occured within June (Annex - 2a). HPAI Virus is changing its morphological features from clade 2.2 to 2.3.2.1 and 2.3.2.1a, indicating its power to alter genetic sequence (Annex -2). Such type of outbreaks of different diseases in poultry, including HPAI, has threatened national economy and public health. Regarding the cases of H9, out of total 99 tracheal samples tested from 6th Jan. to 6th Feb. 2019, 19 were confirmed positive cases of H9 and of these 13% were from Chitwan, 38% from Makwanpur, 19% from Nawalpur and 6% from Gorkha district (Bhusal and Gupta, 2019). In a study conducted by Sharma and Shrestha (2019) from March 2018 to Feb. 2019 on avian influenza type A in live bird market of Chitwan, they found 12.50 % (n= 25/200) positive by RT-PCR technique. Similarly, Regmi *et al*. (2019) had reported that out of 5037 samples tested at Veterinary Laboratory, Pokhara during March 2018 to February 2019 by rapid PAT, 2360 (46.84 %) samples were found sero-positive for *Salmonella* spp.

Epidemiological status recording system: Veterinary Epidemiology Centre established at Tripureshwor had been collecting and analysing the epidemiological data from the grass-root level each month and reporting to OIE representation Office, Japan since more than last two decades. But, now, the local government is authorized to implement animal health services in

their command areas. However, the linkage among the local governments, provinces and federal level is missing in terms of undertaking epidemiological study, data collection and reporting. The Epidemiology Section of DLS is solely trying to collect such data. Considering the sensitivity and importance of the epidemiological information in the country, DLS is trying to coordinate with provincial and local government to rebuild the mechanism for collection, recording and reporting of epidemiological data from all levels of the government.

e. Formal and informal import - export of poultry and poultry products

According to the government rules, Tribhuvan International Airport is the only entry or exit point for chicks, eggs and other types of birds. Parent chicks, hatching eggs, SPF eggs, ducklings and other fancy birds are being formally imported annually (Figure - 3and Annex-5). In 2016/17, more than 2.0 million parent chicks and 0.3 million hatching eggs were imported through TIA. The data indicates that there is a great annual variation in the number of imports. Whatever commodity is imported that are kept in the parent stock farms or in the hatcheries, and later chicks are distributed in the various districts. There are 138 hatcheries in the target districts and some agro vets or Companies who distribute chicks, eggs and poultry meats in various districts, as per demand.



	2016/17	2015/16	2014/15	2013/14	2012/13
Parent Broiler chicks	1943426	971790	1183900	1464718	871569
Parent Layer chicks	106946	92880	98332	138378	95326
Hatching eggs	319880	43920	36400	82080	130480
DODucklings	0	498	0	0	0

Figure 3: Importation of patent chicks, hatching eggs and d ducklings

Formally, no poultry and poultry products are permitted via roadway or through land, but due to similarities in tradition and culture and about 1050 kilometres of open border with India, there is high possibility of entering poultry and poultry products through informal trading. Central AQ Office, Budhanilakantha (2014/2015) had reported that a total of 8094 chicks and broiler chickens were destroyed by Animal Quarantine Check-post, Kankadvitta. Similarly, destruction of 9, 80683 chicks, chickens and eggs and 4067 Kg of poultry meat by Animal Quarantine Check-posts during three years (2014/2015 to 2016/2017; Annex - 6) may justify the situation of informal trading of poultry and poultry products in the Indo- Nepal border.

Culture of giving chicken or cock to the wed daughter as gift is another concern to cross the disease in the bordering areas. Moreover, it has been observed that there are some people in the bordering areas who bring adult poultry from Indian Territory/ states every week or even every day and sell in the Nepalese markets or locality. During hot summer days, when all schools and colleges are closed in the Indian side, remarkable volume of Indian eggs enter into Nepal informally. All these may carry some disease-causing agents in Nepal and may act as the source of outbreak of the poultry diseases.

f. Vaccine production and importation

Poultry industry of Nepal also consumes large volume of poultry vaccines. Of the total doses of vaccine produced or imported, live vaccines rank the first. Two laboratories in Nepal are producing some of the important poultry vaccines. For the import of vaccines, air-shipment via Tribhuwan International Airport is only permitted. National Vaccine Production Laboratory (NVPL), Tripureshwor is the only Government vaccine producing laboratory in the country. It produces most of the live poultry vaccines such as RD F1 strain vaccine, Ranikhet R2B strain vaccine, ND I2 strain vaccine, IBD intermediate strain vaccine and the total volume is 29.1 million doses per year. Vaccines so produced are distributed through ten stockists residing at Biratnagar, Banepa, Tripureshwor, Chitwan, Parsa, Kaski, Rupandehi (Butawal), Nepalgunj and Dhanagadhi district. During the discussion it was found that Laboratory bears the ability to increase its capacity if the skilled human resource, physical facilities are increased and maintained.

Hester Company of Kavrepalanchowk district is a single private poultry vaccine producing Company in the country and it is contributing to the supply of the poultry vaccines. Despite the production of these two laboratories, seven superstockists are importing a huge volume of poultry vaccines in the country. Out of 66.5 crore doses vaccine imported, about 47 crore doses were poultry vaccines in 2016/2017 (Central Animal Quarantine Office, 2017; DAH, 2017). Interaction with different stakeholder revealed that the present volume of poultry vaccine exceeds 900 lacs doses. Avian Encephalomyelitis, AE + Fowl Pox, Fowl Cholera, IB, IBD, MD, ND, NDF strain, NDR2B, ND B1, ND+ IB, Reo Virus Vaccine are the live vaccines that are imported frequently in a large volume. About 6-7 Superstockists of Kathmandu valley import these vaccines and distribute in the major cities/ poultry pocket districts (Annex-11). Despite the ban on importation of vaccine against HPAI, as found during FGD in Chitwan and Kaski, some of the poultry raisers disclosed the fact that some people are importing vaccine against HPAI illegally from the southern border and using in their chickens. But the basic measures to be taken for the prudent use of such vaccine are not taken by both farmers and the government. Only 3 Veterinary drug companies were found in the targeted districts (Annex- 12).

10. Results based on the present study

Pre-tested, approved and separate checklists were used for poultry farmers, traders, transporter, Government technicians, and security personnel for the field study. Local leaders were also interviewed wherever possible. From the data/ information so obtained were compiled, analyzed, simplified and expressed in terms of per month or per week to make the data /information more practical. As the study was based on the focus group discussion and key informant interview, not in the household survey, only tentative figures are mentioned and put in round figures.

Epidemiological status recording system

As stated in section 9 d above.

Feed industry in the target districts

A total of 87 feed industries (see Annex- 8) are running in the target districts (Kathmandu =24, Lalitpur = 3, Bhaktapur = 13, Chitwan = 24, Kaski = 15 small, Jhapa = 3 and Sunsari = 5). But only 20 -25% feed ingredients are supplied from internal source and rest of the ingredients are obtained from India, Bangladesh, Brazil, USA and other foreign countries. These feed industries have their dealers or retailers in the districts where commercial poultry industries are growing. Such suppliers/ dealers deliver feed, and sometimes chicks and eggs to the farmers or to the egg dealers by trucks or jeeps.

Transportation system in the target districts

Transportation of poultry, DOCs, poultry products, feed or drugs are done either by the vehicles managed by the suppliers or owner of the industry in the target districts. Hatcheries, Feed Industries or poultry farms having vehicles transport DOCs, poultry or feeds to the stakeholders. If not, vehicles are hired by the suppliers to supply the demanded commodities to the stakeholders. Study showed that drivers of these suppliers/ dealers are aware of the cross contamination, but, as they said, they do not wash the vehicles after delivery of the consignment due to unavailability of plenty of water in their routes. Drivers rarely use disinfectants to clean vehicles. If feed is delivered by the hired vehicle, sanitary and hygienic practices are mostly compromised.

Application of legal frameworks

Big poultry farms, hatcheries and slaughtering places are found working in line with the existing rules to much extent. Smallholders are found far back to apply these provisions. In brief, following legal provisions are found not applied or weakly applied by the stakeholders:

- Article No. 3 (2), Article 4 and farm monitoring/ inspection provision of Article 5 of Commercial Poultry Farm and Hatchery Operation Guidelines (*Nirdeshika*), 2071 BS.
- Small hatcheries are running without formal registration
- Biosecurity and waste management provisions of schedule No. 13, Article 6 of Commercial poultry farm and hatchery operation guideline (Nirdeshika), 2071 are

mostly ignored by the small holder poultry farmers, some big farmers and hatchery people are in exception.

- Rules 3 (2), (3) and (8), 5 (3), 6(3) and (4) and 7 (2) of Standard for Transportation and Storage of eggs, 2071 BS are not followed
- Salmonella testing of poultry by the poultry breeding farms and hatcheries as per Poultry Breeding Farm Standard, 2062 BS are found totally neglected.
- Provisions for the construction of hatchery buildings, sanitation and hygiene, visitor's management as per Hatchery Standards, 2062 BS are partially followed in many cases and fully neglected in Kathmandu valley.
- Rules 3 Gha (9) and cha, monitoring procedures as given in *Pashu Quarantine Karyabidhi*, 2064 BS not followed.

10.1 Lalipur district

a. Poultry production and poultry products in the district:

Poultry industry is one of the leading industries in Lalitpur district. Bhaisepati, Thaiba, Chapagaun, Godawari, Imadol, Luvu, Lele, Lamatar and Chhampi are the major poultry pockets in the district. A total of 40 layers, 1000 broiler (more than 5000 stocks) and 40 local poultry farms and 15 duck farms have been identified as large farms, although farms of less than 5000 poultry are about 500 in the rural areas. Estimated layers population is 800 thousand which produce 400 eggs per day, whereas about 1600 thousands of broilers are raised by the farmers in 2 months. Four hatcheries running in the district are producing and distributing 300 thousand DOCs per week. A total of 270 thousand local poultry is estimated in the district. Interesting point to be noted is that more than 90 % commercial and semi-commercial poultry farmers are from outside Lalitpur district.

Common poultry diseases found in this district are ND, IB, IBD, ILT, Salmonellosis, E. coli infection, MD and CRD. But, Avian Encephalomyelitis, HPAI, LPAI, ALC and infectious Coryza have been also recorded. In this context, only passive surveillance is conducted in the district due to break in regular recording and reporting chain. DLS is trying to coordinate with provincial government to conduct risk-based surveillance in the districts.

b. Traders:

Number of traders and input suppliers involved in the district: Poultry production is also guided by the input supply and trading. In Lalitpur 20 poultry/ day-old- chicks (DOC) suppliers, 7 eggs suppliers, 4 feed millers and 4 agro-vet suppliers (live vaccine suppliers) and more than 369 poultry meat sellers are actively engaged. Supply of the poultry, DOC and other inputs are greatly dependent on disease outbreaks, market demand or farmers' demand.

c. Imports/ collection and major entry points:

(1) Poultry collection and major entry points

Hatcheries, feed millers, agro vets have their own networks in the country. In most cases DOC, feeds and vaccines are supplied form one door, and when the poultry or eggs are ready to be marketed farmers sell their products to the same supplier. This is why, 7500 adult layers / spent hens are collected by the collectors of this district from Chitwan and Makwanpur (1500) , Kathmandu (n= 3500) and Bhaktapur (n= 2500) in one month, whereas 465 thousand of broilers are collected from Nuwakot (n= 45000), Dhading (n= 45000), Chitwan (n= 105,000), Kathmandu (n= 150,000), Makwanpur including Mahottari, Sarlahi, Bara and Parsa districts (n= 90,000), Sarlahi, Sindhuli and Bhaktapur (n= 30,000) per month into Lalitpur. Likewise, around 100 thousand of broiler DOC are imported in the district via Kathmandu (n= 40,000), Chitwan (n= 20,000) and Bhaktapur (n= 40,000) in a month. The estimated figure for DOC layer is about 20,000 from Chitwan district per month and about 6000 backyard poultry (Giriraja and coloured broilers) are collected from Bhaktapur (n= 4000) and Kavrepalanchowk districts (n= 2000) in one month. When the demand of broiler chicken increases in the district chickens are collected and brought from Dhangadhi and Butwal as well. Movement (in - and out) of poultry and poultry products is presented in Value Chain Mapping **(**Figure -4) and value chain diagram is presented in Figure - 5. 1 MT each of dressed meat is brought from Kathmandu and Bhaktapur per day.

Based on the volume, husbandry practice and veterinary inspection- Bhattedanda, Lankuri Bhanjyang, Chovar (Kathmandu), Balkhu (Kathmandu), Jadibuti (Bhaktapur), Balkumari (Bhaktapur - Lalitpur) and Kupandol (Bagmati bridge) are considered as the most risky entry points for this (Lalitpur) district because of inadequate inspection and certification system.

(2) Eggs importation:

In addition to the eggs produced in the district, considerable volume of eggs are imported from Morang, Mahottari, Chitwan, Dhading, Kavrepalanchowk, Bhaktapur and some parts of Kathmandu. Importation of the chicken eggs is not regular, but huge volume of duck -eggs are coming in the district during festivals.

(3) Vaccine Import:

Regarding the vaccine supply, agro-vets having cold chain facilities buy all types of live poultry vaccines (e.g. ND, IBD, AIB, ND+IB, AE, MD, etc.) from the superstockists of Kathmandu district and distribute to the poultry farmers as and when necessary. Volume of the vaccine used is dependent on number of poultry, season and availability of vaccines in the market. Besides, as per key informant, some live vaccines imported illegally from India through ***Thori*** point of Biragunj, Jaleshwor

(Mahottari) and Kavrepalanchowk pass (Sanga bhanjyang) are also distributed among particular farms.

(4) Feed and feed ingredients

Situation of importation of readymade feed from various districts seems to be tentatively 4350 MT per month (i.e. Nuwakot = 15 MT, Chitwan = 20 MT, Makwanpur and terai districts = 40 MT, Bhaktapur = 5 MT, Kathmandu =30 MT and Rupandehi = 35 MT/day). Compared to the readymade feed, small volume of feed ingredients (1050 MT) is imported to Lalitpur from Terai districts in one month, of which 80 % of the ingredients are said to be from Indian States.

(5). Manure importation:

No manure is imported in the district

Analysis of the data indicates that collection of poultry/DOC or feed/ feed ingredients from various districts and importation of such commodities in Lalitpur district may pose a great threat to poultry industry due to outbreak of diseases in the district.

d. Movement/ export of poultry, eggs and inputs from Lalitpur

Movement of poultry, eggs and related inputs seems to be very complex in and outside the districts. Poultry or related commodity is coming in the district, but concurrently the same commodity is going out. On discussion the stakeholders explained that each commodity holder has some special clients (relatives, faith on the company, price, etc.) in various districts, where they send the commodity on demand or on regular basis.

(1) Poultry, DOC, eggs and feed and vaccine supply from Lalitpur district

Generally, finished layers poultry is supplied to Kavrepalanchowk, Kathmandu and Bhaktapur districts on demand. But in the month of July 2019 only 5000 layers were transported to Khotang district for some reasons. Finished broilers are sent to Bhaktapur, Kavrepalanchowk, Sindhuli, Ramechhap, Mahottari (Bardibas area). Of the 300 thousand DOC produced weekly in the district, about 170 thousand chicks are supplied to Bhaktapur (10%), Kavrepalanchowk (10%), Sindhupalchowk Ramechhap and Dolakha district (3%), Sindhuli, Dhading, Kaski, Chitwan, Bara, Parsa, Rautahat and Sarlahi (70%) and Kathmandu (07%). Backyard poultry, feed ingredients and live vaccines are not found to be supplied to other districts.

Of the total eggs available in the district, 921 boxes of eggs (1 box = 210 numbers) are supplied to Kathmandu (714 boxes), Kavrepalanchowk and Bhaktapur (100 boxes in each district) and Ramechhap and Dolakha districts (7 boxes) per day, but information so obtained during the discussion with stakeholders revealed that some

parties of Lalitpur also send eggs to Okhaldhunga and Solukhumbu once in a year, especially in tourist season.

(2) Market and Slaughterhouse/ place and meat marketing:

There are no organized poultry markets/ *hat baazar* in Lalitpur district, but local poultry are marketed at Lagankhel, Guwarkho, Nakkhu, Sanepa and Shankhamul areas. Small markets are unofficially run at some places. Adult poultry collected from different districts are slaughtered and marketed, although there is no scientific slaughterhouse in the district. No dressed meat is supplied from the district. Biosecurity in the slaughtering places and meat shops is very poor (80% unsatisfactory). Poultry meat produced by the butchers is not sold outside the district.

(3) Waste management/ disposal:

Waste materials are the major source of microorganism. Waste materials in the poultry industry are culled chicks, dead poultry due to disease or during transportation or heat/ cold stress. During the study in the Lalitpur district techniques of waste disposal seemed to be very different from the technical recommendations. Only big hatcheries have got biological pits; 10% small holder farmers dump the dead chicks, chickens and other waste products in their farm field and rest farmers sell it to the pig and fish farms, including gut materials. If foul smell is coming out from the poultry carcass and cannot be used for other purpose, the meat of such chicks or poultry is sold at the unit rate of Rs. 25; for small bird Rs.50; for larger bird Rs. 100 and for spent hen Rs. 120.

(4) Manure supply:

Poultry manure contains high level of nitrogen, phosphorus and potassium and hence farmers are much more interested to use poultry manure in vegetable production. Due to such demand from outside, poultry farmer's sale surplus manures to other districts. But, such sales are quite seasonal, as the demand increases in the potato and tomato sowing seasons (Feb- March and Oct- Nov.). Traders explained that 120, 80 and 60 MT of manure is supplied to Makwanpur, Kavrepalanchowk (Panuti and Dhunkharka) and Dhading districts respectively. But farmers said that the volume may exceed to 200 MT for Kavrepalanchowk and 120 MT for Dhading, 56 MT for Nuwakot and 64 MT for Sindhupalchowk. Some key informants said that manure is even supplied to Bhaktapur, Ramechhap, Dolakha and Okhaldunga districts on demand. Besides, some farmers bring manure from their farms located in the village and use in their field neat by other's poultry farm. It can be concluded that a significant volume of manure is exported from the district and any infected consignment may cause disease outbreaks in these districts, also outbreak may occur in the farm due to use of manure from other farms.

Poultry Value Chain Mapping for Lalitpur

Figure 4: Movement of poultry and poultry products to and from Lalitpur district

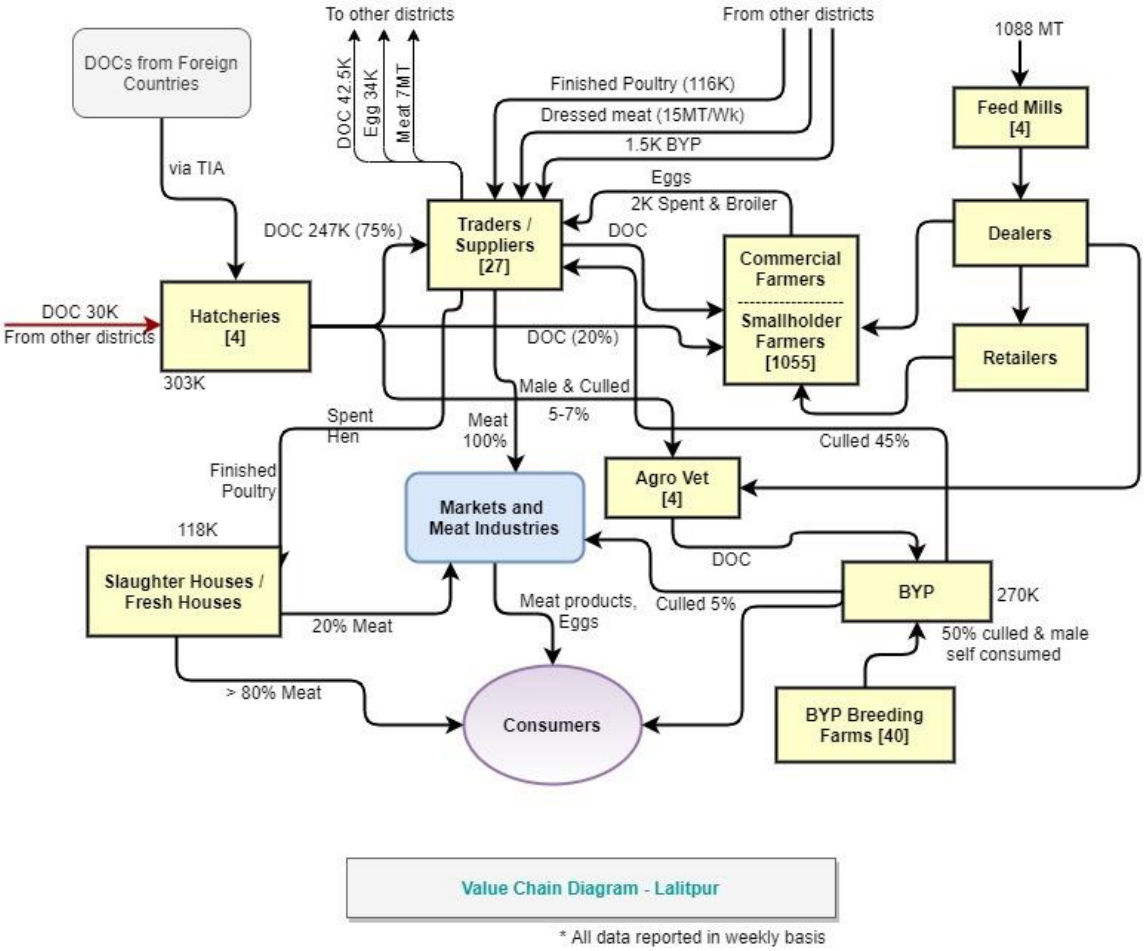


Figure 5 - Value Chain Diagram - Lalitpur

Incoming and outgoing routes of poultry products (Lalitpur)

Based on the frequency of movement of poultry and poultry products, districts were categorized as "top"(more than 3 times movement of commodities), "moderate" (2-3 times) and "low" (less than 2 times) to analyse the data. Bhaktapur, Kathmandu, Chitwan are the principal districts from where large volume of such commodities are coming in Lalitpur. Likewise, low volume of eggs (chicken and duck eggs) comes from Morang. Details of it are given in Table - 3.

Poultry and poultry products are transported either using national or internal highways. In-route drop is usually practiced based on the demand. In fact, Kathmandu valley can be considered as a single point, as these commodities most frequently move within these three districts. Considering the risk of the poultry diseases entering to the particular district, more focus has been given to the incoming routes regardless of the volume of consignments. However, risk of disease transmission in larger areas exists if the consignment is infected or contaminated with microorganism.

While analysing the pathways for movement of poultry and poultry commodities, four incoming routes are identified, of which route 1 and 2 (Table-3) are more frequently used by the traders. Makwanpur of route 4 is common for Bara and Parsa districts, and some Indian birds may enter informally during crisis period (Table-3).

Table 3: Incoming routes of poultry and poultry products

Sorted by frequency		Sorted by Routes	
Top	Bhaktapur	**Route 1**	Kathmandu
	Kathmandu		Bhaktapur
	Chitwan		Kavrepalanchowk
Moderate	Dhading		Mahottari/ Bardibas
	Kavrepalanchowk		Morang
	Mahottari	**Route 2**	Dhading
	Makwanpur		Chitwan
	Nuwakot		Rupandehi
Low	Morang	**Route 3**	Nuwakot
	Parsa	**Route 4**	Makwanpur
	Rupandehi		Parsa, Bara
	India		India

From Lalitpur, large volume of poultry and poultry products more frequently go out to Kathmandu, Bhaktapur, Kavrepalanchowk districts and smaller volume go to Dolakha and Ramechap districts, whereas moderate and less frequently these commodities go to 3 and 9 districts respectively (Table - 4).

While analysing the pathways for movement of poultry and poultry commodities, five routes have been identified, of which route 1 and 2 are more frequently used by the traders (Table-4), although DOCs are supplied to Chitwan from this district on weekly basis.

Table 4: Outgoing routes of poultry and poultry products

Sorted by frequency		Sorted by Routes	
Top	Kavrepalanchowk	**Route 1**	Kathmandu
	Bhaktapur		Bhaktapur
	Kathmandu		Kavrepalanchowk
	Dolakha		Sindhupalchowk
	Ramechhap		Dolakha
Moderate	Dhading		Ramechhap
	Okhaldhunga		Sindhuli
	Sindhupalchowk	**Route 2**	Dhading
Low	Bara		Kaski
	Chitwan	**Route 3**	Okhaldhunga
	Kaski		Solukhumbu

	Khotang		Khotang
	Makwanpur	**Route 4**	Makwanpur
	Parsa		Bara
	Rautahat		Parsa
	Sindhuli		Rautahat
	Solukhumbu	**Route 5**	Chitwan

Critical control points (CCP):

During the transportation of poultry and poultry products, certain highway crossing points have been identified for each district, and the likelihood of mixing of poultry at these points is high. Such places are considered as critical control points in view of inspection, certification and disease surveillance activities. Critical control points for Lalitpur district due to chances of en-route mixing are: **Dhulikhel (Kavrepalanchowk), Bardibas (Mahottari), Hetauda (Makwanpur) and Narayanghat and Mungling (Chitwan)**, whereas, based on the mixing of live poultry within the district, traders and suppliers and BYP seemed to be actual CCP to be controlled by technical interventions.

10.1.1. Farmers' practice

During the study, FGD was conducted with the key farmers of the district. Farmers experienced that outbreak of poultry diseases occur due to exchange of poultry or eggs from other farms, and therefore none of the farmers brought any poultry or eggs from other farms since last 2-3 years. But, to feed the school children, farmers raising broilers were found buying some crates of eggs from markets twice a month. Farmers were never found selling poultry and poultry products to other farms but directly selling their produce in the markets (mainly to the input suppliers or distributors) located at Bhaktapur, Kathmandu, Kavrepalanchowk, Dolakha and Ramechhap districts. As the participants explained, human movement from one farm to other is restricted by the farmers, especially during the outbreak of diseases in the adjoining districts. However, in general, 5% people were found to move from one farm to other.

a. Inputs and product transportation system

A total of three feed industries located in the district are supplying poultry feeds to the farmers. These industries also supply feeds to Kathmandu, Bhaktapur, Kavrepalanchowk and Nuwakot districts. But, as each feed industry has their special clients, feed is imported from Makwanpur, Chitwan, Biratnagar, Nuwakot and Nabalparasi districts. Such to and fro movement of vehicles and feed might have attributed to the increase in the number of outbreak of poultry diseases in the country.

Movement of vehicle, feed, feed ingredients and service provider in the farms are the major concerns of the poultry farmers. Except in the big hatcheries, no farmers have vehicle for the transportation of the feed, feed ingredients. Vehicle Managers / suppliers are contacted by the feed suppliers and are provided with a list of the farms that need feeds on that particular day. The vehicle drops feed on the farm as given in the list and moves to other farms accordingly.

On the way back the same vehicle carries eggs or poultry or both without taking any additional precaution or proper washing of the vehicle. Such type of vehicular movements occurs once in a week for the transportation of feed and eggs. But, except in very small farms, no vehicle enters into the poultry farm. Likewise, no outsider is permitted to enter in the farm. Workers sometimes go to the markets for marketing but take precaution as oriented. Most of the farm use vaccine either by their trained staff or by themselves. In some cases, farmer asks to the Veterinary staff to vaccinate their birds. In such condition the technician covers 3-4 farms a day, increasing the chance of contamination. Most of the layer farmers have contracted one technician each and the contractor visit the farm on weekly basis.

b. Movement of farm machineries, equipments, and accessories (used tray, sacs)

It has been noted that except debeaking machine no machineries, equipments, accessories are shared with other farms. Debeaking machine is always sprayed with disinfectant (Virkon). Farm vehicle is disinfected by the farmers when it is moved.
Regarding the reusing of egg-try for saving money, many farmers bring the used egg-trays from the market in low price, sprayed with disinfectants and use for egg storing. None of the farmers sell any farm accessories to other farms, as they are found to be aware of disease transmission. Practice of re-use of jute sac has been stopped due to change in the materials (now only plastic bags are used).

c. Movement of poultry feed / feed ingredients within the farmers

Farmers of Lalitpur district did not practice borrowing and lending of feed or feed ingredients from or to other farms. Although some farmers had previously used feed from other farms during *Nepal Banda*, such practice was found to be obsolete now. Farmers were found to be aware of the disease risks involved in the process.

10.1.2. Key informants' response

Discussion / interview were conducted with related officials, veterinary technicians and security personnel of Lalitpur district. They summarized the points indicating poor sanitary condition, lack of slaughterhouse, transport of DOC, feed, weak inspection and certification system, problems in waste disposal, etc. Likewise, poultry traders and farmers have identified the major problems and suggested some key points to improve the situation of the poultry industry (see Annex - 9)

10.2 Bhaktapur district

a. Poultry production and poultry products in the district: Bhaktapur district is popular for agriculture and poultry production is a very common practice. Major pockets of the commercial poultry are Thimi, Kamal Binayak, Suryabinayak, Bhaktapur Municipality, Dadhikot, Katunje, Palanse and Tathali areas. A total of 50 layers, 10 big broilers (more than 5000 stocks) and more than 500 small broiler farms (less than 5000 number), 150 broiler grower farms, 70 local poultry farms and a few duck farms have been identified. Estimated commercial layers population is 400 thousand which produce about 140

thousand eggs per day, whereas about 700 thousand of broilers are raised by the farmers in 2 months. There are 14(13+1) hatcheries running in the district that are producing and distributing 300- 320 thousand DOCs per week, of which only 232 thousand chicks are distributed in other districts of the country. A total of 120 thousand local poultry is estimated in the district. There are no organized poultry markets/ *hat baazar* in this district, but local poultry market is more concentrated in Suryabinayak, Kamalbinayak, Thimi, and Manohara river basin. Major common poultry diseases found in this district are similar to those found in Lalitpur district. In these days, only passive surveillance is conducted in the district due to the breakage in regular recording and reporting chain.

b. Traders: Poultry production is also guided by the input supply and trading, and trading is dependent on price, market demand and production volume. In Bhaktapur 10 poultry/ day-old- chicks (DOC) suppliers, 12 eggs suppliers, 10 feed millers and 7 agro-vet suppliers (live vaccine suppliers) and more than 100 poultry meat sellers are actively engaged.

c. Imports/ collection by the district

(1) Imports/ collection and major entry points: As stated in case of Lalitpur, hatcheries, feed millers, agrovets have their own networks in the country. Major entry points are Sanga bhanjyang, Bode, Mulpani, Tikathali, Balakot, Lankuri bhanjyang, Gothatar and Pepsicola point of Kathmandu. Some hatcheries also supply chicks in Nuwakot and Rasuwa districts and finished poultry (mainly broilers) are collected from these districts. In most cases DOC, feeds and vaccines are supplied form one door, and when the poultry or eggs are ready to be marketed farmers sell their products to the same supplier who supplies them feed, medicine, chicks etc. This is why, about 10 thousand layers / spent hens are collected by the collectors of this district from Kavrepalanchowk (n= 3000), Chitwan (n- 5000), Makwanpur and adjoined terai districts (n= 2000) per week. But in many instances these layers also come from Itahari, Janakpur, Sindhuli and Lalitpur (Tikathali). Similarly, 21,000 broilers are collected from Kavrepalanchowk (n= 7000), Chitwan (n= 7,000), Makwanpur including Mahottari, Sarlahi, Bara and Parsa districts (n= 7000 to 8,000) weekly. Neither broiler nor layers DOCs are imported in the district from other districts. About 4000- 5000 backyard poultry (Giriraja and Coloured broilers) are collected from Kavrepalanchowk district in one month.

(2). Eggs importation: It was noted that five egg dealers located at Banepa of Kavrepalanchowk district collected 1120 boxes of eggs (1 box = 210 eggs) daily from Biratnagar, Dharan and Itahari and distributed to Ramechhap, Dolakha/ Charikot/ Jiri, Kathmandu and Sindhuli districts. Of the total 1120 boxes, 100 - 108 boxes (n= 21000 - 22680 eggs) are collected daily or 147 - 158 thousand per week by Bhaktapur.

(3). Vaccine importation : Regarding the vaccine supply, agro-vets having cold chain facilities buy all types of live poultry vaccines (e.g. ND, IBD, AIB,ND+IB, AE, MD, etc.) required for both layers and broilers from the superstockists of Kathmandu district and

distribute to the poultry farmers as per vaccination schedule given by hatcheries. Tentatively, vaccine is procured and supplied 4-5 times a month. Volume of the vaccine used is dependent on the number of poultry, category of chickens, season and availability of vaccines in the market. Besides, as per key informant, some live vaccines are imported illegally in the name of VVND from India through Jaleshwor (Mahottari) point and come to the district from Kavrepalanchowk pass (Sanga bhanjyang) are also distributed among interested farmers. This is indicative of poor monitoring of imported vaccines in the district.

(4). Feed and feed ingredients: As per traders, importation of readymade feed from various districts seems to be tentatively 1500 MT per month (Chitwan = 1200 MT, Makwanpur and terai districts = 300). Almost similar volume of feed ingredients are imported in a month by the feed millers to prepare poultry feed in the district.

(5). Live poultry Market: Similar to Lalitpur, no organized poultry market is observed for commercial poultry. Commercial poultry is directly transported from farm to the slaughtering places. An unorganized local poultry markets are found in Suryabinayak, Kamalbinayak, Thimi and Monahari river basin.

(6). Meat and meat products collection: About one MT of dressed meat is brought from Kathmandu district for sale.

(7). Manure importation: During the season of vegetable, especially in potato showing season, 64 to 80 MT of manure is imported in Bhaktapur by some farmers from Chitwan, but small volume also comes from Lalitpur and Kavrepalanchowk districts. Such manure is not used by the poultry farmers but may be used in neighbouring field.

Presently, Bhaktapur district is just like a gateway for the movement of poultry, poultry products, feeds and feed ingredients to Kathmandu and Lalitpur districts from/to eastern side. Analysis of the data indicates that collection of poultry/DOC or feed/ feed ingredients is done from various districts.

d. Movement/ Supply/ export from the district: Movement of poultry, eggs and related inputs seems to be very complex in and outside the districts as it is seen in Lalitpur. Commodities coming in the district are concurrently going out. During discussion, stakeholders provided similar reasons as described by traders in Lalitpur district.

(1) Poultry, DOC, eggs and feed and vaccine supply

As per stakeholders, finished poultry is supplied to Kavrepalanchowk, Lalitpur and Kathmandu districts regularly. About 1,000 -1500 adult poultry go to Banepa/ Kavrepalanchowk daily. From Banepa those birds go to Nala, Nagarkot and Tatopani of Sindhupalchowak. A total of 10 cold stores from Kathmandu district collect 5000 broilers

per day from various farms and carry for slaughtering. Average 2000 -3000 finished broilers go to Lalitpur district daily. This district also supplies some broiler poultry to Nuwakot Rupandehi, and Rasuwa districts in festivals or to army camps.

Of the 300 thousand DOCs produced in Bhaktapur district per week, about 232 thousand chicks are supplied to Kathmandu (20%), Chitwan, Kavrepalanchowk, Sindhupalchowk Ramechhap, Dolakha and Sarlahi districts (60%), Lalitpur (15%), Nuwakot and Dhading (5%) per week. Almost 10% chicks are under weight or weak. Rest 38 thousand chicks are distributed within the district. Besides, of 13000 parent chicks produced per week by Sagar Poultry Breeding Farm, 10,000 chicks are weekly supplied to Sindhuli and Siraha (Golghar) districts; rest 3000 chicks are sent to Banke, Nepalgunj. Vaccine is not supplied outside Bhaktapur district.

Eggs supply: Bhaktapur district supplies 2000 eggs per month to the municipalities of Kavrepalanchowk and 60,000 to 65,000 eggs per month to Kathmandu district. In winter season some traders supply eggs to the eastern area of Lalitpur district, but the volume is not fixed.

Feed supply: Feed supply from Bhaktapur to various districts is estimated to be 600 MT in one season.

(2) Market and Slaughterhouse/ place and meat marketing:

No adult poultry is collected by the meat suppliers from other districts. But, some cold stores of this district sale 1MT each per day to Kathmandu, Lalitpur and Kavrepalanchowk districts.

Biosecurity in the poultry slaughtering places and meat shops is very poor (70% unsatisfactory).

(3) Waste management/ disposal:

Waste material management is a great problem in Bhaktapur district also. Around 85- 90 per cent dead chicks or adult birds (either died during transportation or at farms) are sold to the pig or fishfarms at the rate of Rs 50- 100 per bird, and 10-15 per cent are dumped by the farmers; and only big farmers have biological pits to dump dead birds. Some farmers throw dead poultry into the river.

(4) Manure supply:

As Bhaktapur is one of the major districts in agriculture one- half of the total manure produced (75 MT/ day) daily is used locally, and 9-10 MT , 3-4 MT, 18-60 MT and 5 -32 MT manure is supplied to Kathmandu, Nuwakot, Kavrepalanchowk and Sindhupalchowak districts respectively during the season of vegetable sowing. Such movement of manure may cause disease outbreaks in these districts, if infected. The estimated volume of manure given by the government officials varied greatly (375 MT).

Movement (in - and out) of poultry and poultry products is presented in Value Chain Mapping for Bhaktapur **(**Figure -6) and value chain diagram is presented in Figure - 7.

Incoming and outgoing routes of poultry and poultry products

Based on the available information, Chitwan and Kavrepalanchowk ranked top to supply poultry and poultry products to Bhaktapur district more frequently. However, Makwanpur also supplies finished broiles frequently. Small volumes of these commodities come from other 9 districts, while live vaccine comes from Mahottari / Jaleshwor informally (Table-5). Out of 3 major routes identified most of the eggs, finished broilers and spent hens come from route number 1. If the price increase in Nepalese side, finished broilers and spent hens come to the district from Indian border side. Detail of pathways of incoming movement of these commodities is presented in (Table- 5).

Poultry Value Chain Mapping for Bhaktapur

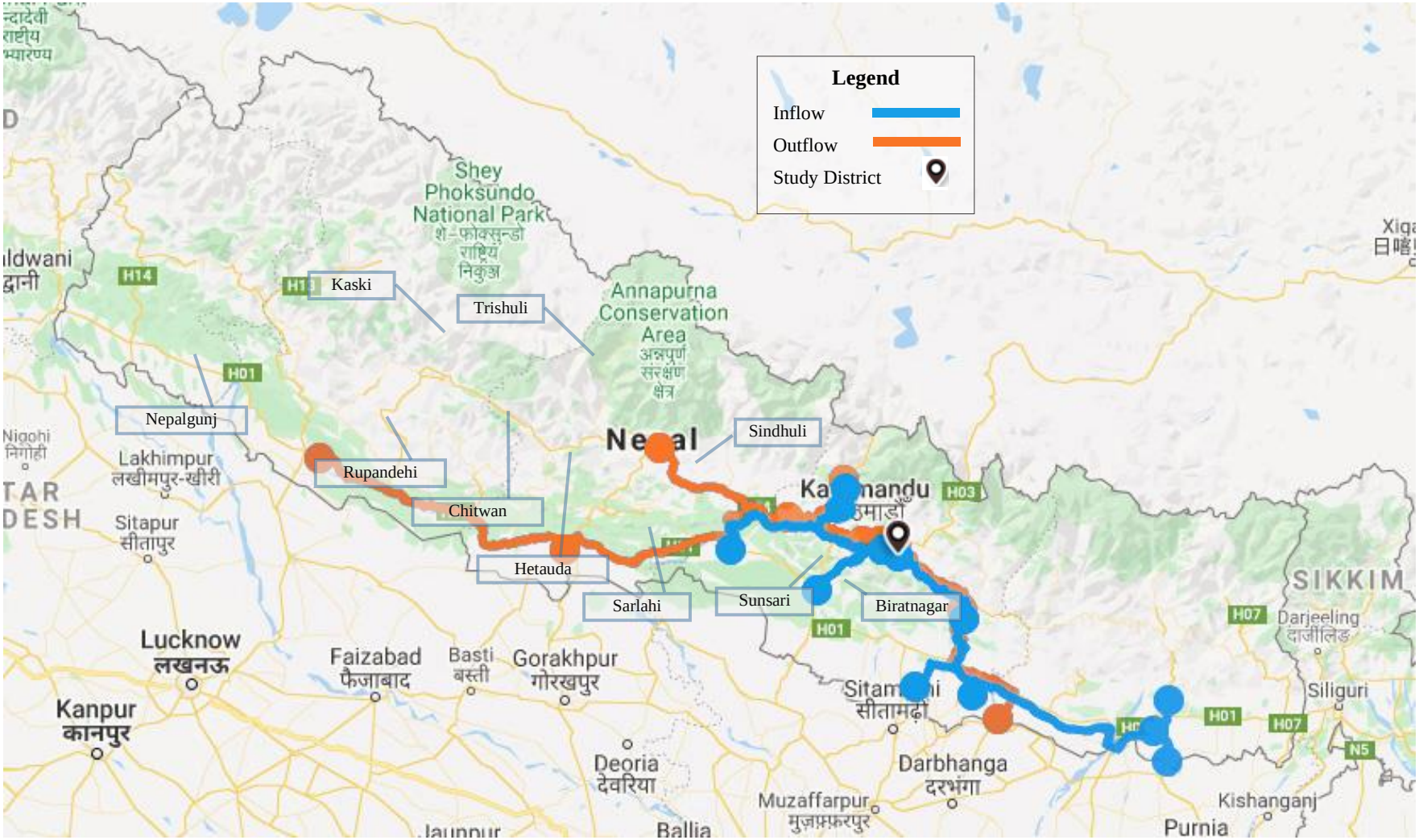
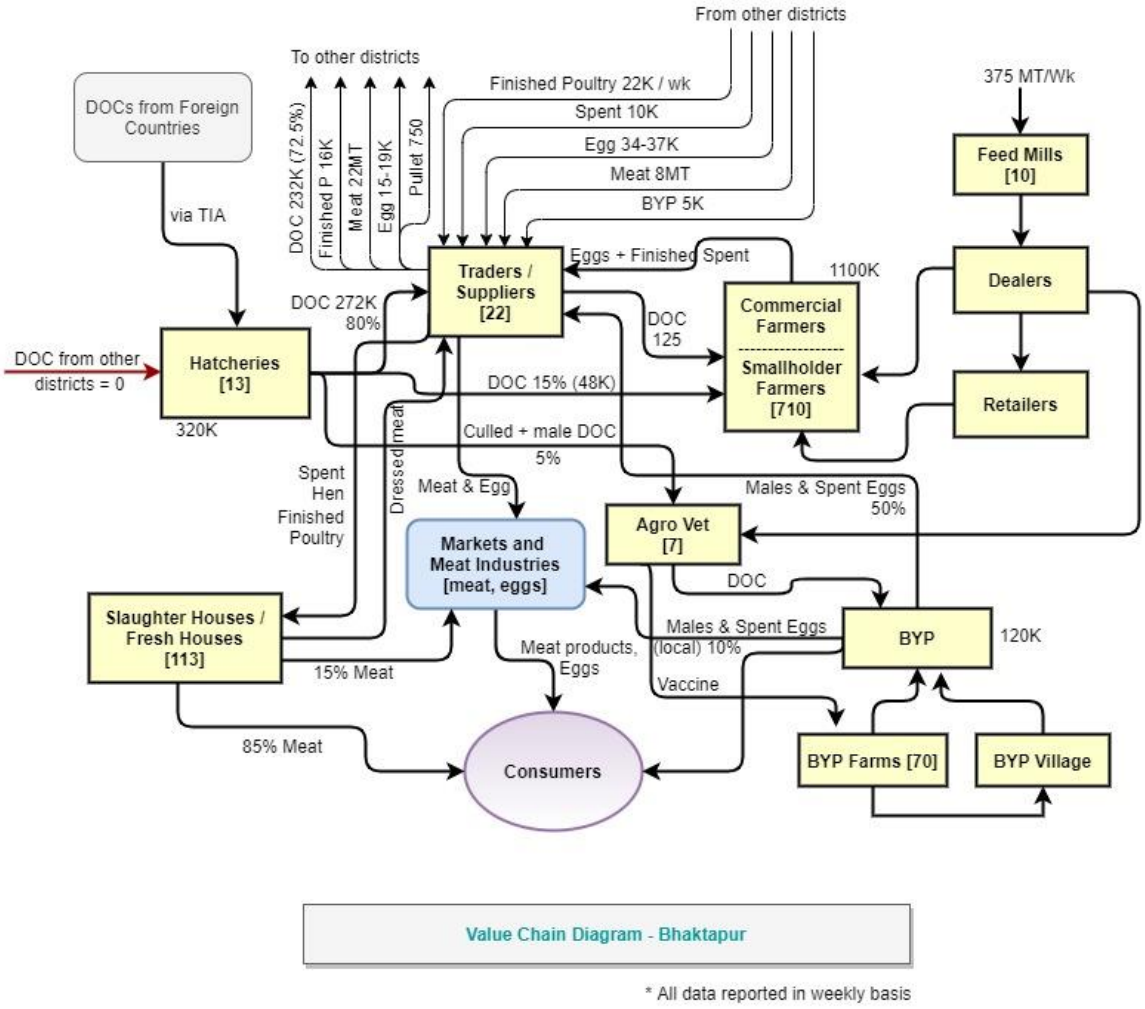


Figure 6: Movement of poultry and poultry products to and from Bhaktapur district



Value Chain Diagram - Bhaktapur

* All data reported in weekly basis

Figure 7 - Value Chain Diagram - Bhaktapur

Table 5: Incoming routes of poultry and poultry products

Sorted by frequency		Sorted by Routes	
Top	Chitwan	**Route 1**	Chitwan
	Kavrepalanchowk		Kathmandu
Moderate	Sindhuli		Lalitpur
	Kathmandu		Makwanpur
	Makwanpur		Jaleshwor/Mahottari
	Sunsari		Mahottari /Bardibas
Low	Biratnagar		Parsa
	Dhanusha		India (feed ingredients)
	India	**Route 2**	Kavrepalanchowk
	Jaleshwor		Sindhuli
	Lalitpur		Dhanusha
	Mahottari		Sunsari
	Nuwakot		Biratnagar
	Parsa	**Route 3**	Rasuwa
	Rasuwa		Nuwakot

Bhaktapur supplies a large volume of poultry and poultry products to Kathmandu, Lalitpur and Kavrepalanchowk districts per week. But it also supplies lesser volume of these commodities to Nuwakot Rasuwa and Sindhupalchowk districts. Hence, based on the frequency of supply these are the top-ranking districts. Less frequently, these commodities are supplied to other 6 districts (up to Banke district). For the movement of these commodities, four routes have been identified, of which route number 1 and 2 can be considered as more frequently used routes for supply, although DOCs are supplied weekly (Table- 6).

Table 6: Outgoing routes of poultry and poultry products

Sorted by frequency		Sorted by Routes	
Top	Kathmandu	**Route 1**	Kathmandu
	Kavrepalanchowk		Kavrepalanchowk
	Lalitpur		Sindhupalchowk
	Nuwakot		Siraha
	Sindhupalchowk		Lalitpur
Low	Banke	**Route 2**	Nuwakot
	Dhading		Rasuwa
	Kaski	**Route 3**	Dhading
	Rasuwa		Kaski
	Rupandehi	**Route 4**	Banke
	Siraha		Rupandehi

Critical control points:

Critical control points for Bhaktapur district due to risk of en-route mixing are: Kathmandu(Koteshwor), Dhulikhel (Kavrepalanchowk), Bardibas (Mahottari) and Hetauda (Makwanpur), whereas, based on the mixing of live poultry within the district, traders, suppliers and live markets seemed to be prime CCP to be controlled by technical interventions.

10.2.1. Farmers' practice

During the study, FGD was conducted with the key farmers of the district. When farmers experienced that outbreak of poultry diseases occur due to exchange of poultry or eggs from other farms, none of the farmers are bringing any poultry or eggs from other farms as explained by the farmers of Lalitpur district, as they said, rather sell eggs directly to the major markets. But, to feed the school children farmers keeping broilers bring some crates of eggs from markets twice in a month. Farmers never sell the poultry and poultry products to other farms but directly sell to the markets (mainly to the input suppliers or distributors) located at Bhaktapur, Kathmandu, Kavrepalanchowk, Dolakha and Sindhupalchowk districts. As the participants explained, human and machinery movement (except debeaking machine) from one farm to other is totally restricted by the farmers, especially during the outbreak of dieases in the adjoining districts. This practice simulates with that of the Kathmandu's farmers.

a. Inputs and product transportation system

Thirteen feed industries located in the district are supplying poultry feeds to the farmers. These industries also supply feeds to Kathmandu, Kavrepalanchowk and Nuwakot districts. But, as each feed industry has their dedicated clients, feed is imported from Makwanpur, Chitwan and Morang districts. Such to and fro movement of vehicles and feed might have attributed to the increase in the number of outbreak of poultry diseases in the country.

Movement of vehicle, feed, feed ingredients and service provider in the farms are exactly similar to that practiced by the farmers/ traders of Lalitpur district, raising the threat to the poultry industry. Farm workers also sometimes go to the markets for marketing but take precaution as oriented.

Most of the farm use vaccine either by their trained staff or by themselves. In some cases, farmers ask Veterinary Hospital’s staff to vaccinate their birds. In such condition, the technician covers 3-4 farms a day, increasing the chance of contamination. Most of the layer farmers have contracted one technician each and the contractor visit the farm on weekly basis.

b. Movement of farm machineries, equipments, and accessories (used tray, sacs)

It has been noted that except debeaking machine no machineries, equipments, accessories are shared with other farms. Debeaking machine is always sprayed with virkon. Farm vehicle is disinfected by the farmers when it is moved. Regarding the reusing of used egg-try, to save

money, many farmers bring the used egg-trays from the market in low price, sprayed with disinfectants and used for egg storing. Rests are similar to that found in Kathmandu district.

c. Movement of poultry feed/feed ingredients within the farmers

Farmers of Lalitpur district neither borrow feed or feed ingredients nor send these commodities from their farm. Rest is similar to that found in Kathmandu district.

d. Waste management/ disposal

Waste management is poor in Bhaktapur district as mentioned in the trader's section (10.2. b).

10.2.2. Key informants' response

During the discussion traders, farmers and KI of Bhaktapur district have identified the major problems and suggested as that of Lalitpur district. Some key points to improve the situation of the poultry industry (see Annex - 9)

10.3 Kathmandu district

a. Poultry production and poultry products in the district: Agriculture and poultry production is concentrated at the peri-urban areas of Kathmandu district. Dairy and poultry farms are raised to fulfill the demand of the metro-city. Major pockets of the poultry are located in Manamaiju, Kavresthali, Tokha, Gongabu, Chandeshwori and Jorpati. A total of 118 big layer farms and 1382 medium layers farms, 458 broiler (less than 5000 stocks), 30 big broiler farms with more than 5000 broilers and about 4000 small broiler farms, 10 Kroiler farms, 2 parent farms and some local poultry farms and a few duck farms have been identified . Estimated commercial layers population is 300 thousand which produce about 120 thousand eggs per day, whereas about 670 thousand broilers are raised by the farmers in one slot (2 months). Total 10 hatcheries running in the district are producing and distributing 194 thousand DOCs per week, of which 136 chicks are distributed in other districts of the country. A total of 170 thousand local poultry is estimated in the district. There are no organized poultry markets/ *hat baazar* in this district, but Local poultry market is more concentrated in Chabahil, Balaju, Kalimati, Mahankal, Jorpati, and Koteshwor.

Common poultry diseases found in this district are similar to that found in Bhaktapur and Lalitpur district. Only passive surveillance is conducted in the district due to breakage in regular recording and reporting chain by Government structure.

b. **Traders**: Poultry production is also guided by the input supply and trading, and trading is dependent on price, market demand and production volume. Number of traders also vary by season and market demand. In Kathmandu 50 - 100 poultry/ day-old-chicks (DOC) suppliers, 50 eggs suppliers, 24 feed millers (plus 120 dealers) and 100 agro-vet suppliers (live vaccine suppliers) and more than 150 poultry meat sellers are actively engaged at Tripureshwor, Kalanki, Balaju Gongabu areas.

c. Imports/ collection by the district

(1). Imports/ collection and major entry points: As stated in case of Lalitpur and Bhaktapur districts, hatcheries, feed millers, agrovets have their own networks in the country. Major entry points of poultry for Kathmandu district are Chhampi/ Pharping, Nag-dhunga/ Dhading, Panchmane/Tinpiple, Tokha/ Gurje Bhanjyang, Kupandol bridge, Kalopul, Jadibuti, Melamchi/ Naglebhare, Kakani, Jarsingh Pauwa. In most cases DOC, feeds and vaccines are supplied form one door, and when the poultry or eggs are ready to be marketed farmers sell their products to the same supplier who supplies them feed, medicine, chicks etc. This is why about 98 thousand layers / spent hens are collected by different collectors of which 2000 are from Nuwakot, 3000 each from Kavrepalanchowk and Dhading, 45000 from Chitwan, 25000 from Makwanpur and adjoining terai districts, and 10000 each from Lalitpur and Bhaktapur districts per week. But in many instances these layers also come from Jhapa, Sunsari, Janakpur, Sindhuli districts. Similarly, 90 thousand of broilers are collected from Kavrepalanchowk (n= 15000), Chitwan (n= 35,000), Makwanpur including Mahottari, Sarlahi, Bara and Parsa districts (n= 30,000), and 5000 each from Lalitpur and Bhaktapur per day. Kathmandu imports 5000 and 2000-3000 pullets from Chitwan and Bhaktapur weekly. About 20,000, 5000 and 5000 backyard poultry (Giriraja and Coloured broilers) are collected from Chitwan, Bhaktapur and Lalitpur districts respectively per week or about 120,000 per month to fulfill the demand of local poultry meat at Kathmandu. Likewise, 500-700 Giriraja and Coloured broilers are imported daily from Jhapa. Some backyard poultry are imported from Sindhupalchowk Sindhuli, and Bhaktapur (n= 500) and Nuwakot districts too. As some hatcheries also supply chicks in Nuwakot, upper Dhading and Rasuwa districts, poultry (mainly broilers) are collected from these districts.

Regarding the importation or collection of broiler DOC from other districts, 55000 are imported from Nuwakot and Dhading, 200,000 from Chitwan, 2000 from Kavrepalanchowk, 300,000 from Siraha, Sunsari, Makwanpur and other adjoining Terai districts, 200,000 and 100,000 from Bhaktapur and Lalitpur districts respectively. Similarly, 40,000 layers DOC are collected from Chitwan, 10,000 each from Butawal and Terai and Lalitpur districts per week.

(2). Eggs importation: Eggs are imported from Kaski, Gorkha, Chitwan, Nuwakot, Kavrepalanchowk, and Dhading. But the estimated number of eggs was not clear. However, 2-3 trucks of duck eggs (1 truck = 24 boxes and 1 box = 210 eggs) per month come to Kathmandu district from Terai districts, where most of them are from Indian side. Some duck farms located in the Terai districts cover only 10-15 percent of duck-egg demand of Kathmandu valley.

(3). Vaccine inportation : Regarding the vaccine supply, agro-vets having cold chain facilities buy all types of live poultry vaccines (e.g. ND, IBD, AIB,ND+IB, AE, MD, Lasota, Fowl Pox, etc.) required for both layers and broilers from the superstockists of

Kathmandu district and distribute to the poultry farmers as per vaccination schdule given by hatcheries. Besides vaccine produced within the country such poultry vaccines are imported mainly from USA, Korea, Italy, India, Israel, Indonesia and Croatia. Discussion with superstockiest of Kathmandu revealed that net 66 -70 crore vaccines are imported from foreign territories, and local production is 2.9 crore (NVPL, 2019), as per NVPL report. Of the total vaccine imported, only 17.18 % vaccine killed one - means that more than 83 % imported vaccines are live in nature.

(4). Feed and feed ingredients: As per traders, importation of readymade feed from various districts seems to be tentatively 4650 MT per month (Chitwan = 1800 MT, Makwanpur and terai districts = 1500 MT, Bhaktapur = 300 MT and Nuwakot = 1050 MT). Almost similar volume of feed ingredients are imported in a month by the feed millers to prepare poultry feed in the district. But, 90 % of the total volumes of feed ingredients are imported from Uttar Pradesh, Uttarakhanda and Bihar States of India.

(5). Meat import/collection: Kathmandu imports dressed meat from Chitwan and slaughterhouse of Nawalparasi. Average volume is 10 MT per day from chitwan and 2 MT from sunsari district.

(6). Live Poultry Market: Like in other districts no organized poultry market is observed for commercial poultry. Commercial poultry is directly transported from farm to the slaughtering places. An unorganized local poultry markets are found in Balaju, Chabahil, Kalimati, Mahankal, Jorpati and Koteshwor areas.

(7). Manure importation: No manure is collected in the district from other districts.

d. Movement/ Supply/ export from the district

Movement of poultry, eggs and related inputs seems to be very complex in and outside the districts as it is seen in Lalitpur.

(1) Poultry, DOC, eggs and feed and vaccine supply: Generally finished broilers are supplied to Lalitpur, Bhaktapur, Kaski and Chitwan districts in small volumes. The volume of the consignment depends on the demand from the district. Of the total 194 thousand DOCs produced in Kathmandu district per week, about 70 percent chicks are supplied to other districts such as to Dhading (10%), Chitwan (15%), Rupandehi (10%), Dang (2%), Nepalgunj (2%), and Dhanagadhi (1%) from the lower route. Likewise, from the western route it is supplied to Gorkha, Lamjung, Kaski, Parbat, Baglung and Myagdi, which comprises about 2 % of the total supply. Besides, 25 % of the total DOCs go to Lalitpur, 18-20 % to Bhaktapur and 15 % go to Sindhupalchowk, Dolakha and Ramechhap districts per week. About 5000 -10000 chicks are sent in one truck. Some volumes of DOC are supplied to Sunsari district too.

Vaccine supply: Kathmandu supplies both live and killed vaccines to almost all districts of the country through dealers / suppliers.

Eggs supply: Kathmandu district supplies 157.5 thousand eggs per week (= 630 thousand eggs/month) to Bhaktapur, Kavrepalanchowk, Dolakha, Ramechhap, Okhaldhunga and Solukhumbu districts.

Feed supply: Feed supply from Kathmandu is estimated to be 50 MT per day in the vegetable sowing season. It goes to Bhaktapur, Kavrepalanchowk, Dolakha, Solukhumbu, Ramechhap, Sindhuli, Okhaladhunga, Bardibas, Sarlahi and Makwanpur districts. Actual volume was not clear either from the traders or from the farmers.

(2) Market and Slaughterhouse/ place and meat marketing: Cold stores (and also Slaughter places) located at Kathmandu district collect broilers/ adult poultry from Kathmandu, Bhaktapur, Lalitpur, Chitwan, Kaski, Nuwakot and Rasuwa districts. These cold stores slaughter and store dressed poultry and supply to other districts on demand. But the biosecurity at the slaughtering place seems very poor. Both raw / dressed poultry meat is supplied to Rasuwa, Nuwakot, Bhaktapur and Lalitpur district. Some coldstores send raw meats to Pokhara -Mustang and Manang, Nepalgunj -Jumla, Lukla by air cargo.

(3) Waste management/ disposal: Waste material management is a great problem in Kathmandu district too. Hatcheris produce substandard chicks as much as 5% of the total production. More than 80 per cent substandard, dead chicks or adult birds (either died during transportation or at farms) are sold to the pig or fish farms at the rate of 50- 100 per bird, and 15 per cent are dumped by the farmers, whereas 5 % farmers throw dead chicks or poultry in the river; and only big farmers have biological pits to dump dead birds. One trader at Jhul pokhari, Aitar of Kirtipur (Kathmandu) was found to be collecting dead poultry from the surrounding areas and boiling that for more than 30 minutes and finally selling that offalat the rate of Rs. 50 -100 per bird. Some kennel farms were also found buyingsuch birds to feed their dogs.

(4) Manure supply: About 1000 Kg manure is produced from 1000 broilers in 2-months period in Kathmandu and this district sends poultry manure to Chitwan, Laitpur, Bhaktapur, Nuwakot, Dhading, Makwanpur, Kavrepalanchowk, Sindhupalchowk and Dolakha districts.

Movement (in - and out) of poultry and poultry products is presented in Value Chain Mapping for Kathmandu **(**Figure -8) and value chain diagram in Figure -9.

Poultry Value Chain Mapping for Kathmandu

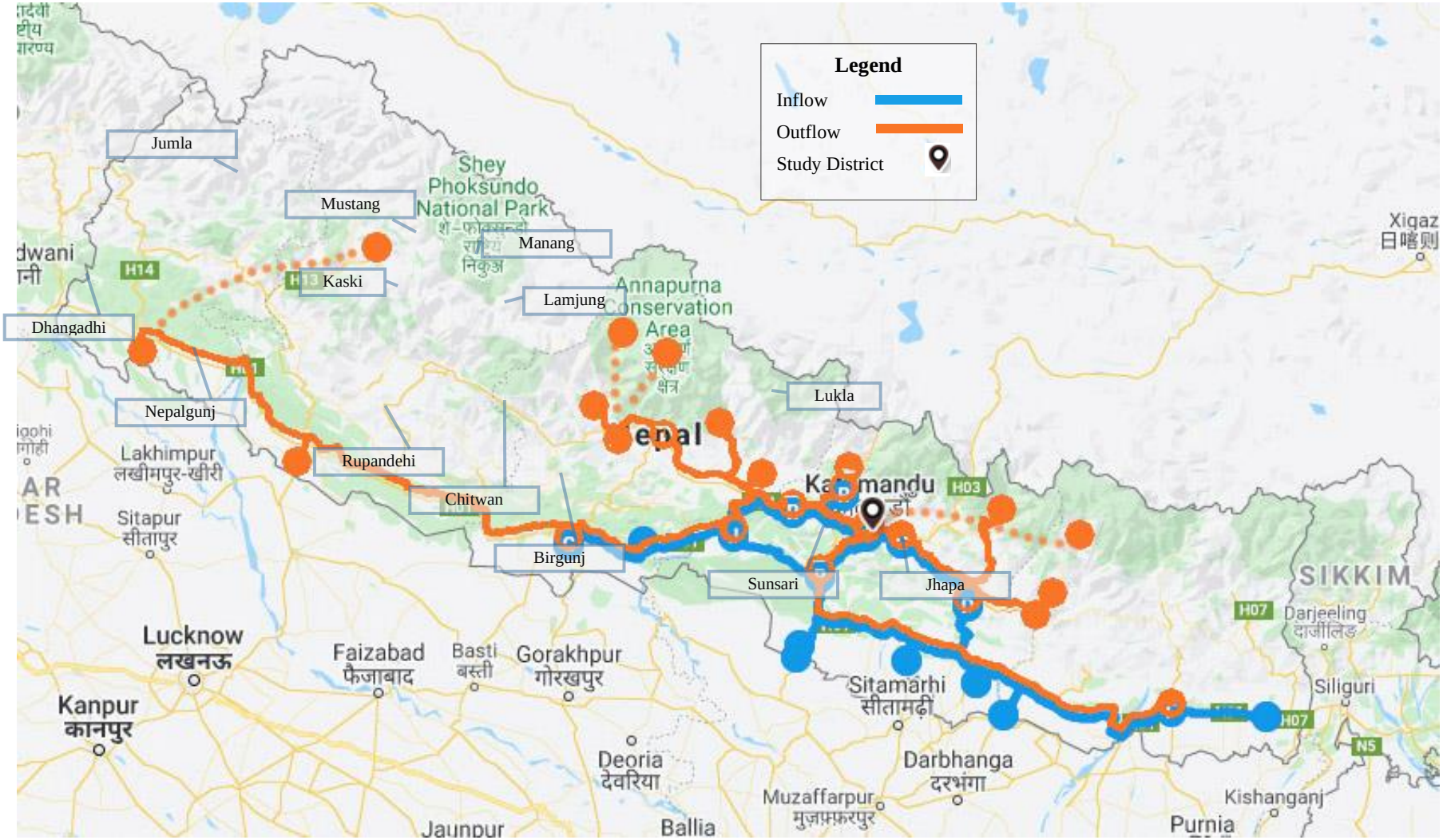


Figure 8: Movement of poultry and poultry products to and from Kathmandu district

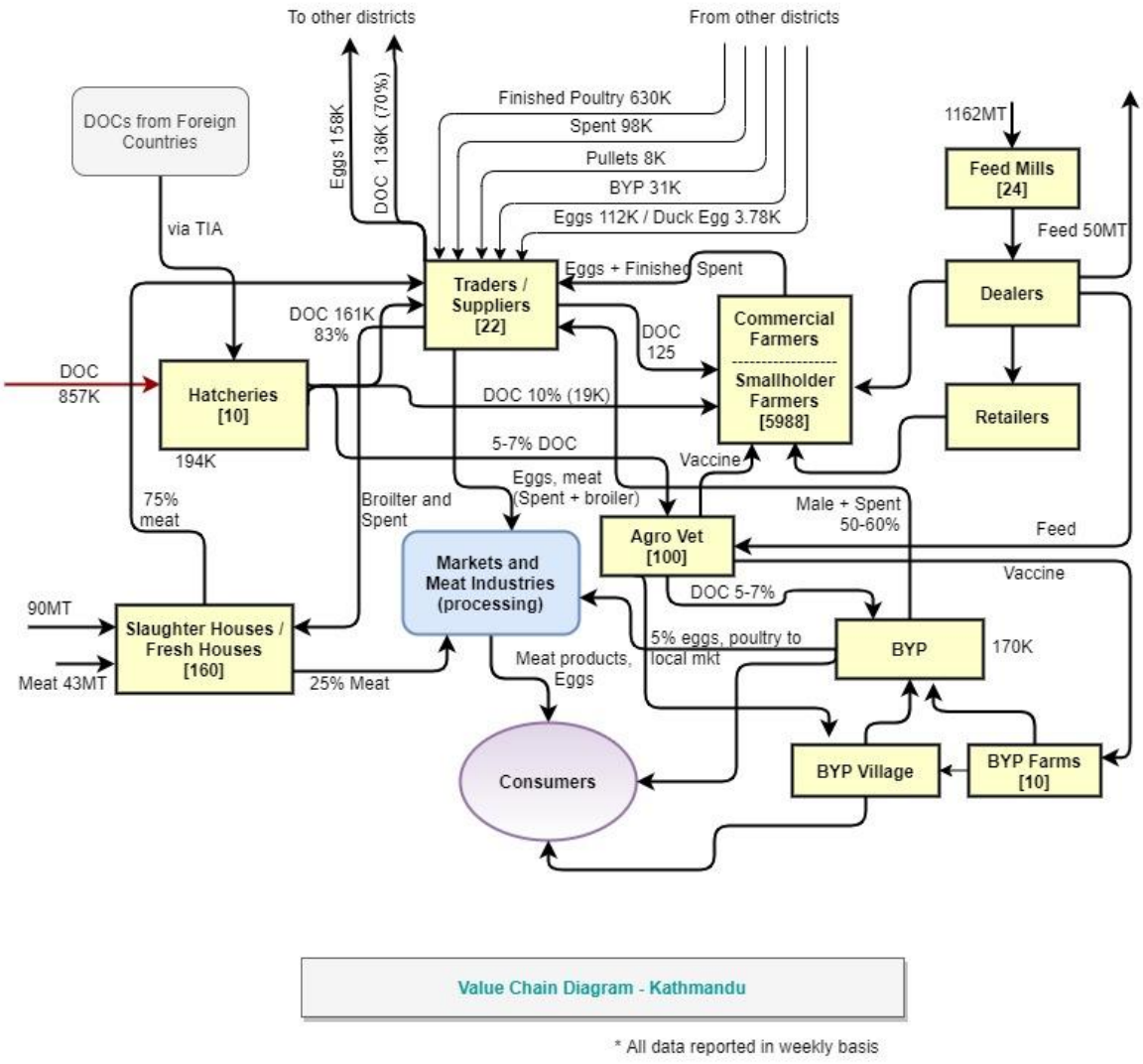


Figure 9 - Value Chain Diagram - Kathmandu

Incoming and outgoing routes of poultry products

As huge population of Kathmandu consume the poultry products, all types of poultry and poultry products including duck eggs and dressed meats are collected from various districts weekly, even from Jhapa, Sunsari and Rupandehi. Daily collection is seen from local farms. Morethan 85% duck-eggs are imported informally from India. But these commodities are brought more frequently from Chitwan, Bhaktapur, and Lalitpur and with moderate frequency from Makwanpur route (Table-7). Five major routes are used to bring poultry, poultry products and feeds/ feed ingredients and they enter in the district from Kavrepalanchowk, Makwanpur, Chitwan, Dhading and Prithivi highway routes.

Table 7: Incoming routes of poultry and poultry products

Sorted by frequency		Sorted by Routes	
Top	Chitwan	**Route 1**	Bhaktapur
	Bhaktapur		Lalitpur
	Lalitpur		Kavrepalanchowk
	Nuwakot		Sindhuli
	Kavrepalanchowk		Sindhupalchowk
	Makwanpur		Sarlahi
	Parsa		Siraha
	India		Sunsari
Moderate	Dhading		Jhapa
	Sunsari	**Route 2**	Makwanpur
	Jhapa		Parsa
Low	Bara		Bara
	Dhanusha		Dhanusha
	Gorkha		India
	Kaski	**Route 3**	Nuwakot
	Nawalparasi	**Route 4**	Kaski
	Rupandehi		Gorkha
	Sarlahi	**Route 5**	Chitwan
	Sindhuli		Dhading
	Sindhupalchowk		Nawalparas
	Siraha		Rupandehi

About 45% of DOCs are weekly sent to Lalitpur and Bhaktapur district, moderate volume (30%) of DOCs are sent Chitwan and Sindhupalchowk disrtict. This district supplies dressed meat directly to Lukla and to Manang and Mustang via Pokhara/Kaski and to Jumla district via Nepaljunj by air -cargo (Table- 8). Five major routes are used by the traders to supply these commodities by road.

Table 8: Outgoing routes of poultry and poultry products

Sorted by frequency		Sorted by Routes	
Top	Bhaktapur	**Route 1**	Bhaktapur
	Lalitpur		Lalitpur
Moderate	Chitwan		Kavrepalanchowk
	Kavrepalanchowk		Sindhupalchowk
	Dolakha		Lukla (by air)
	Dhading		Dolakha
	Kaski		Ramechhap
	Nuwakot		Solukhumbu
	Okhaldhunga		Sindhuli

	Ramechhap		Okhaldhunga
	Sindhupalchowk	**Route 2**	Dang
	Solukhumbu		Chitwan
Low	Dang		Dhading
	Dhangadhi		Dhangadhi
	Gorkha		Jumla (by Air)
	Jumla		Nepalgunj
	Lamjung		Rupandehi
	Lukla	**Route 3**	Parbat
	Makwanpur		Myagdi
	Manang		Mustang (Air)
	Mustang		Manang (Air via Kaski)
	Myagdi		Lamjung
	Nepalgunj		Gorkha
	Parbat		Kaski
	Rasuwa	**Route 4**	Sunsari
	Rupandehi		Makwanpur
	Sindhuli	**Route 5**	Nuwakot
	Sunsari		Rasuwa

Critical control points:

Critical control points for Kathmandu district due to chances of in-route mixing are identified as Dhulikhel (Kavrepalanchowk), Narayangad and Mugling (Chitwan), Hetauda (Makwanpur) and Bardibas (Mahottari). But, based on the mixing at the district, traders, suppliers, live markets can be considered as the CCP to be addressed by an appropriate technical intervention.

10.3.1. Farmers' practice

During the study FGD was conducted with the key farmers of the district. When farmers experienced that outbreak of poultry diseases occur due to exchange of poultry or eggs from other farms, none of the farmers are bringing any poultry or eggs from other farms as explained by the farmers of other districts, as they said, rather sell eggs directly to the major markets.

a. Inputs and product transportation system

Twenty-four feed industries located in the district are supplying poultry feeds to the farmers. These industries also supply feeds to Kathmandu, Kavrepalanchowk and Nuwakot districts. But, as each feed industry has their special clients, feed is imported from Makwanpur, Chitwan, Biratnagar districts. Such to and fro movement of vehicles and feed might have attributed to the increase in the number of outbreak of poultry diseases in the country.

Movement of vehicle, feed, feed ingredients and service provider in the farms are exactly similar to that practiced by the farmers/ traders of other districts, raising the threat to the poultry industry. Farm Workers also sometimes go to the markets for marketing but take precautions as oriented.

Farmers buy required vaccines from dealers located at places in Kathmandu city and use vaccine either by their trained staff or by themselves. In some case, farmers request technicians to vaccinate their birds. In such condition the technician covers 5- 11 farms a day, increasing the chance of contamination. Most of the layer farmers have contracted one technician each and the contractors visit the farm on weekly basis.

b. Movement of farm machineries, equipments, and accessories (used tray, sacs)

It has been noted that except debeaking machine no machineries, equipments, accessories are shared with other farms. Debeaking machine is always sprayed with disinfectants (Virkon). Farm vehicle is disinfected by the farmers when it is moved.
Regarding the reusing of egg-try, to save money, many farmers bring the used egg-trays, crates and feed-sacs from the market in low price, sprayed with disinfectants and used for egg storing.

c. Movement of poultry feed / feed ingredients within the farmers

Big farmers of Kathmandu district neither borrow nor lend feed or feed ingredients from other farms. Small farmers do practice feed exchange during busy seasons or during *Nepal banda*.

d. Waste management/ disposal:

Waste management is also similar to that found in Lalitpur and Bhaktapur districts. Some farmers sell the dead poultry to the pig or fish farms at the rate of 50- 100 per bird and very few dump the dead birds, and only big farmers have biological pits to dump dead birds whereas some farmers throw dead poultry into the river.

10.3.1.2. Key informants' response

During the discussion traders, farmers and KI of Kathmandu district have identified the major problems and suggested some of the important points to improve the situation of the poultry industry (see Annex - 9)

10.4 Chitwan district

a. Poultry production and poultry products in Chitwan district: Dairy and poultry farms are raised to fulfill the demand of the metro-city. Major pockets of the poultry are located in Bharatpur Municipality, Ratnanagar Municipality, Khairahani Municipality, Rapti Municipality and Kalika Municipality. Mangalapur is considered as the capital of

poultry industry in Chitwan district. A total of 502 layers farms and, 1365 broiler (less than 5000 stocks), 45 local chicken farms and 11 duck farms are raised in the district. Estimated commercial layers population is 1209 thousand which produce 3.4 - 4.4 crore eggs in one month, whereas about 3230 thousand broilers are raised by the farmers in one slot (2 months). About 100 hatcheries running in Bharatpur Municipality, Ratnanagar Municipality, Khairahani Municipality, Rapti Municipality (broiler, layers and kroilers) are producing and distributing 11.5 -13.5 lacs DOCs (layers and broilers including colour broilers) per week, whereas 150 thousand of colour broiler and kroiler chicks are produced and supplied to the farmers per week. Of the total DOC produced 21 % chicks are distributed within the district. Farmers raise about 150 thousand pullets per months and some farmers also brood chicks depending upon the situation. Likewise, if the rate of chicks fall very low, hatchery raise the chicks that are not sold, in their farms away from the hatchery. It has been estimated that a total of 312 thousand local poultry is produced in the district per year. Various types of poultry diseases have been recorded in Chitwan district. Among them, ND, IB, IBD, MD, CRD, HPAI, LPAI, *E. coli*, AE and Mycotoxicosis are frequently observed. As in other districts, regular surveillance activities are stopped due to new structure implemented by the government.

b. Traders: Number of traders and input suppliers involved in the district: Poultry production is also guided by the input supply and trading, and trading is dependent on price, market demand and production volume as in other districts. Number of traders also vary by season and market demand. In Chittwan, only 24 traders are found involved for day-old- chicks (DOC) supply and 61 traders are for adult poutry supply. A total of 27 eggs suppliers, 24 feed millers (plus 120 dealers) and 132 agro-vet suppliers (live vaccine suppliers) (out of 172 agrovets) and more than 1000 fresh houses are found in the district, but only 25-30 middle fresh houses are slaughtering more than 100 birds/day. As participants informed, Province 3 Government has provided subsidy to establish slaughterhouses at three places of the district.

c. Imports/ collection by the district

(1). Imports/ collection and major entry points: As stated in case of other districts, hatcheries, feed millers, agrovets have their own networks in the country. Major entry points of poultry for Chitwan district are Lothar in east, Narayani Bridge at Gaindakot, Nabalparasi / Triveni in the west, Mugling Bridge and Dhading district in the north-west although many poultry and DOCs come from Kapilbastu district and Marchbar area of Rupandehi district. Thori and Thutibari are considered as the important informal entry points for poultry, eggs and poultry products. In most cases DOC, feeds and vaccines are supplied form one door, and when the poultry or eggs are ready to be marketed farmers sell their products to the same supplier who supplies them feed, medicine, chicks etc. This is why; layers / spent hens are not collected and imported to the district, but 270,000 broilers are collected monthly from various districts such as Gorkha, Tanahun, Dhading, Lamjung, Kaski, Makwanpur and Nawalparasi districts to slaughter and supply. Pullets and brooder poultry are neither collected by the district nor supplied to other districts.

Regarding the backyard poultry, 80% (n= 15000 per month) of such poultry come from Jhapa district and rest 20% come from Palpa and Nawalparasi districts.

Despite of producing more than 14 lacs DOCs / week in the district, Chitwan imports about 100 thousand broiler chicks per week from Kathmandu, Bhaktapur, Nawalparasi, Eastern and Western Terai districts. Participants attending the discussion could not produce the estimated numbers of DOCs coming from each district, and also could not spell out the name of the eastern and western Terai districts, as they do not know exactly.

(2). Eggs importation: Chicken eggs are not imported into Chitwan district. Trucks loaded with duck eggs enter into Chitwan and goes to Kathmandu or Pokhara during festival season, but do not supply in this district.

(3). Vaccine importation: Regarding the vaccine supply, agro-vets having cold chain facilities buy all types of live poultry vaccines (e.g. ND, IBD, AIB, ND+IB, AE, MD, Lasota, Fowl Pox, etc.) required for both layers and broilers from the superstockists of Kathmandu district and distribute to the poultry farmers as per vaccination schdule given by hatcheries as it is practiced in other districts. Abhinas Vet pharma and Superstockiests of Chitwan district also import live vaccines e.g. ND, IBD, AIB, ND + IB, AE, MD, Lasota, Fowl Pox, etc. directly from the foreign countries (Korea, USA,Itali,India,Israel, Indonesia,etc.) and distribute to their clients. Vaccination of the chicks and adult poultry is done as per the set schedule given by the hatcheries.

(4). Feed and feed ingredients: As per traders, importation of readymade feed from various districts seems to be tentatively 9000 MT per month (Parsa = 60%, Rupandehi= 10%, and Makwanpur district =15% and Kailai = 15% of the total volume). About 21000 MT of feed ingredients are imported in a month by the feed millers to prepare poultry feed in the district. Out of which, 80 % of the total volumes of maize is imported from Pakistan, Brazil, Myanmar, Ukraine, India and Bangladesh and 20 % volume is covered from Nepal from Bara, Parsa, Morang, Sunsari and Dang districts. Total 7950 MT of soya products are imported from India and America in a month, whereas deoiled cake, deoiled rice bran, mustard cake and rice police are imported from India as per need. Actual volume of such ingredients per month may vary from season to season.

(5). Live Poultry Market: Commercial poultry is directly transported from farm to the slaughtering places. There are no organized poultry markets/ *hat bazaar* in this district but culled or spent hen and local poultry are marketed at Balakumari and Sabjimandi haat bazaar (weekly) and twice in a week at Hakim Chowk, Narayanpur chowk, Nahar chowak, Milan Chowk and Baseni. Besides, Nahome chowk, Kand Nagar, Chaubiskothi, and Bikashor Chowk are other places where *haat* bazaars run every week.

(6) Meat and meat products collection

(7). Manure importation: No manure is collected by Chitwan from other districts, but supplied to Kaski, Makwanpur and Dhading districts instead.

d. Movement/ Supply/ export from the district

Movement of poultry, eggs and related inputs seems to be very complex in and outside the districts as it is seen in Kathmandu valley.

(1) Poultry, DOC, eggs and feed and vaccine supply

Finished poultry is supplied to Kathmandu, Bhaktapur, Lalitpur, Kaski districts. Among them major volume go to Kathmandu valley and then to Kaski district.
In addition to 79% of the total DOCs (total =11.5 -13.5 lacs DOCs including layers, broilers and colour broilers/week) produced in Chitwan district per week, about 100 thousand DOCs /week are collected from other districts and about 10 lacs DOCs are supplied to 68 districts. Chitwan district does not supply DOCs to Baitadi, Bajura, Bajhang, Jumla, Dolpa, Mustang, Manang, Dolakha and Solukhumbu districts. DOCs are mainly supplied to Makwanpur, Bara, Sindhuli, Mahottari and Sunsari in the eastern side, whereas those in the western side are Dang, Salyan, Surkhet and Dailekh. Some of the DOCs so collected go to the Kaski district, whereas culled and male chicks (about 150 thousand/week) are mainly supplied to Makwanpur, Sunasari in the east, Rupandehi, Dang, Banke, Surhket, Kailali in the west and in eastern as well as western mid hills. As the stakeholder explained, some culled and male chicks also go to Kaski district to keep as backyard poultry. During discussion, Government Officials explained that there is seasonal supply of DOCs to India (bordering side) unofficially. This district supplies about 730 thousand doses of live vaccine against different diseases to other districts where the DOCs are supplied.

Eggs supply: Out of 3.4 - 4.4 crore eggs produced in the district in a month, about 3 - 3.5 crore of eggs are supplied to other districts. Of the total supply, 75% of the total numbers go to Kathmandu valley, 5% to Gorkha, Lamjung, Parbat, Baglung, Myagdi, 10% to Bara and Parsa district and 10% to mid-western and far western region. Occassionally, some parties of Chitwan supply chicken eggs to Dolpa district also.

Feed supply: Feed and feed ingredients supply from Chitwan district is estimated to be 720 MT per day (21600 MT/ Month). These items mainly go to Dhading, Kathmandu valley, Kavrepalanchowk in the Provience 3; Gorkha, Lamjung and Kaski in the Province 4; and Rupandehi (Butawal), Dang and Surkhet in the Provience 5 and 6. Feed ingredients are mainly supplied to Kathmandu valley, where there are numbers of feed millers.

(2) Market and Slaughterhouse/ place and meat marketing: There is no scientific slaughterhouse in Chitwan. No poultry is collected from other district for slaughtering

purpose. Broilers are slaughtered at Ramnagar, Khairahani, Chanauli, Ratnanagar and Narayangarh. Only Chitwan Valley Cold Store collects chicken from various places / farms of the district and slaughter and dresses it to supply in the Kathmandu valley and Kaski. Estimated volume supply is 10 MT/ day (90% to Kathmandu valley and 10% to Kaski district). Slaughter place located in Nawalparasi district collects broilers from different farms of Chitwan and dresses, and then supplies to Kathmandu and Pokhara Valleys.

Considering biosecurity at slaughtering places, it is 80% satisfactory at large slaughter places, whereas it is 50% satisfactory in small slaughtering places and very poor at personal slaughtering places.

(3) Waste management/ disposal: Waste material management is a great problem in Chitwan district too, except in big farms and big hatcheries, as they have biological pits. Hatcheries produce substandard chicks as much as 5% of the total production and sell as mentioned above. Both dead chicks and adult birds (either died during transportation or at farms) are distributed to the pig or fish farms in free of cost. If not sold, are dumped in the biological pit or in the ground.

Majority of farmers dump the waste materials in their land, but a few small holder farmers throw dead chicks or poultry in the river or in the open space in the rural area.

(4) Manure supply: Chitwan district sends poultry manure to Dhading, Bhaktapur, Kavrepalanchowk, Makwanpur and Sindhuli districts, but the actual volume was not clear.

Movement (in - and out) of poultry and poultry products is presented in Value Chain Mapping for Chitwan **(**Figure -10) and value chain diagram is given in Figure 11.

Poultry Value Chain Mapping for Chitwan

Figure 10: Movement of poultry and poultry products to and from Chitwan district

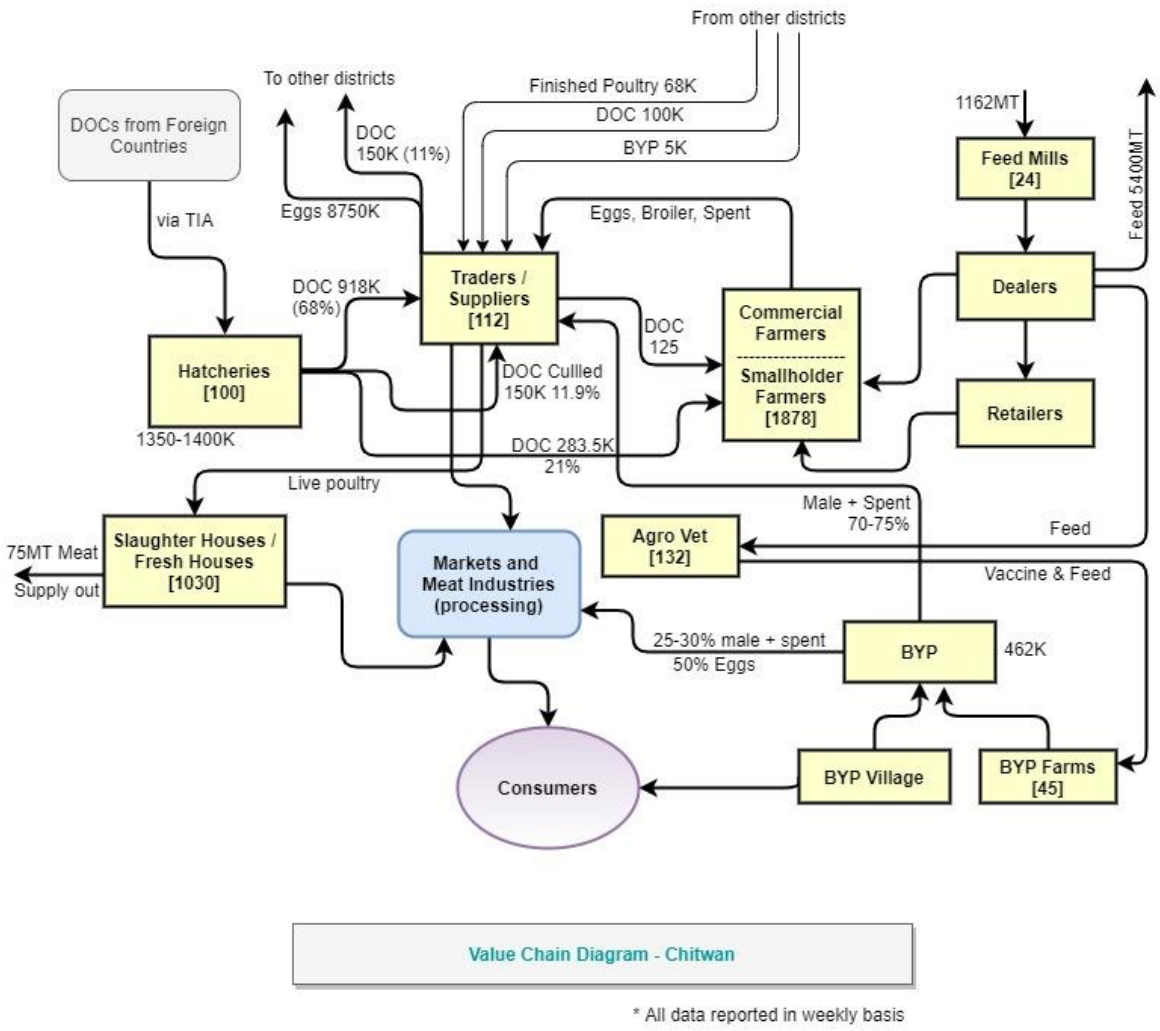


Figure 11 - Value Chain Diagram - Chitwan

Incoming and outgoing routes of poultry products

Although Chitwan is a poultry hub, broilers, native poultry and DOCs are collected from various districts; being most frequently from Nabalparasi district. Only eggs and spent hens are not collected from outside. This district brings these commodities from Jhapa, Rupandehi, Makwanpur and Kathmandu in moderate frequency.

Like in other districts, 4 major routes are identified for this district too, but, interestingly, every consignment crosses this district whether it is either coming from western (Kailali) or eastern (Jhapa) parts of the country (Table -9). Such increased frequency of incoming and outgoing of consignments has increased the likelihood of mixing of the poultry or poultry products in the district.

Table 9: Incoming routes of poultry and poultry products

Sorted by frequency		Sorted by Routes	
Top	Nawalparasi	**Route 1**	Kathmandu
Moderate	Rupandehi		Bhaktapur
	Jhapa	**Route 2**	Makwanpur
	Makwanpur		Parsa
	Kathmandu		Sunsari
Low	Palpa		Jhapa
	Parsa	**Route 3**	Nawalparasi
	Bhaktapur		Rupandehi/ Butawal
	Dhading		Palpa
	Gorkha		Kailali
	Kailali	**Route 4**	Tanahun
	Kaski		Gorkha
	Lamjung		Lamjung
	Sunsari		Kaski
	Tanahun		Dhading

Poultry, especially DOCs, are supplied to more than 60 districts from this district through national as well as internal routes (Table- 10). About 75% eggs and 90% of the dressed meat to be sent out from the district go to Kathmandu, and Kaski takes second position to import.

Table 10: Outgoing routes of poultry and poultry products

Sorted by frequency		Sorted by Routes	
Top	Kaski	**Route 1**	Dhading
	Kathmandu		Kathmandu
	Surkhet		Bhaktapur
	Makwanpur		Lalitpur
	Dang		Kavrepalanchowk
Moderate	Bara	**Route 2**	Sindhuli
	Dhading		Bara / Kalaiya
	Gorkha		Mahottari
	Lamjung		Jhapa
	Rupandehi		Parsa
	Sindhuli		Sunsari
	Kavrepalanchowkpalanchowk		Makwanpur
	Bhaktapur	**Route 3**	Kaski
Low	Banke		Gorkha
	Dailekh		Lamjung
	Dhangadhi		Parbat
	Jhapa		Myagdi

	Kailali	**Route 4**	Banke
	Lalitpur		Dailekh
	Mahottari		Dhangadhi
	Myagdi		Kailali
	Nawalparasi		Dang
	Parbat		Nawalparasi
	Parsa		Rupandehi
	Salyan		Surkhet
	Sunsari		Salyan

Critical control points:

Critical control points for Chitwan district based on in-route mixing are Hetauda (Makwanpur), Bardibas (Mahottari), Mugling (Bordering with Tanahun), and Butwal (Rupandehi), whereas CCP within the district are traders, suppliers and local poultry markets of the city areas.

10.4.1. Farmers' practice

Movement of poultry and eggs:

During the study FGD was conducted with the key farmers of the district. When farmers experienced that outbreak of poultry diseases occur due to exchange of poultry or eggs from other farms, none of the farmers are bringing any poultry or eggs from other farms as explained by the farmers of other districts, as they said, rather sell eggs directly to the major markets. If the broiler farm owner needs some eggs to feed to their children or for household use, they bring eggs directly from the market or even from other poultry farm and consume. Similarly, layer keepers buy broiler chickens either from market or from broiler farm which is nearby. They are aware of the risk of cross contamination in the farm with eggshells if, not disposed properly, but majority of farmers are not aware of the risk of contamination through feathers.
Generally, farmers of Bharatpur, Ratnanagar Municipality do not sell either live layer poultry or eggs from one farm to other, but they sell these items, 5-6 times in 3 months depending up on the age and egg laying rate, in majority of areas of the district and to other districts as explained in the section of traders.

a. Inputs and product transportation system/ Movement of vehicle and /or survice provider

Twenty-four feed industries located at different locations in the districts are supplying poultry feeds to the farmers. These industries also supply feeds to Kathmandu valley, Kavrepalanchowk and Dhading, Gorkha, Lamjung and Dang, Surkhet districts.

Movement of vehicle, feed, feed ingredients and service provider in the farms are restricted and they can reach up to the farm gate only. If service provider has visited to other farm just

before coming to the new farm, such individual is not permitted to enter the farm. During disease outbreak no vehicle goes from one farm to other farm without proper disinfection.
Farm workers (generally 5 in one vehicle) also sometimes go to Kathmandu, Butwal for marketing but they take precautions as oriented.

Procurement and use of vaccine is similar to that stated previously. Difference is that there is one superstockiest at Narayangarh which supplies to other districts as per hatchery schedule.
Most of the layer farmers have contracted veterinarian or one technician each and the contractors visit the farm on weekly basis.

b. Movement of farm machineries, equipments, and accessories (used tray, sacs)

It has been noted that except debeaking machine no machineries, equipments, accessories are shared with other farms. Debeaking machine is always sprayed with disinfectants (Virkon). Farm vehicle is disinfected by the farmers when it is moved. Regular disinfection of vehicle is well practiced during the disease outbreak but is not practiced all year round.
Regarding the reusing of egg-try, crates or sharing of other farm accessories, none of the farm/ farmer is practicing this in Chitwan district. Farmers sell such used items to *Kawadi* located at Narayangarh.

c. Movement of poultry feed / feed ingredients within the farmers

Like in Kathmandu district big farmers of this district neither borrow nor lend feed or feed ingredients from other farms. Small farmers do practice feed exchange during busy seasons or during *Nepal banda*. The feed used in such condition will always be of the same feed company. If borrowed, the volume of the feed will not exceed to two quintals.

d. Movement of poultry manure/ wet litter

Poultry farmers neither bring poultry manure from other farm or market nor use in their land. But, in some condition, neighbor may use it if their land is nearby other's poultry farm. Poultry manure produced in the district is supplied to Nawalparasi, Makwanpur, Dhanakuta, Gorkha, Syanja, Baglung, Kathmandu, Bhaktapur, Kavrepalanchowk and Sindhuli.

e. Waste management/ disposal:

As explained in the traders section (10.4 b).

f. Transporter's situation:

In Chitwan, if farm owner has vehicle, poultry, eggs and feeds are transported from a single farm and if those items are to be transported at a time they are transported by separate vehicles. If not, suppliers provide vehicles and all items are transported by the same vehicle. These items are generally transported weekly. Vehicles carrying poultry or DOCs are cleaned daily, but that carrying feed are washed weekly using soap water. This district transports finished poultry to Pokhara valley, Dhading, Kathmandu valley and Rupandehi district.

DOCs are transported to Kathmandu valley, Pokhara Valley, Makwanpur, Kaski, Parbat, Baglung, Myagdi, Palpa, Banke, Surkhet and Dailekha districts. Some of the drivers have experienced mass death of finished poultry during transportation. Dead poultry is thrown into the forest, not in the river. In most case; delivery is given at the final destination, not in the route.

Biosecurity level in hatchery and farms

- Big hatcheries- 75 % bio secured as per standard practice
- Small hatcheries: some farms (about 40%) do use disinfectants and spray. Biosecurity is strictly maintained during outbreak of the diseases, but all year round. Only a few farmers use sterilized instruments in the farm.
- Farms: 20-25% of farms do have satisfactory biosecurity level as per standard practice.
- If there is no disease outbreak, vehicles are not properly sterilized during transportation of eggs, feeds, and chicks.
- None of the farmers of Chitwan district re-use egg -tray, sacs in their farms.

10.4.2. Key informants' response

During the discussion KI of Chitwan district have identified the major problems and suggested some key information to improve the situation of the poultry industry (see Annex-9):

10.5 Kaski district

a. Poultry production and poultry products in the district: Dairy and poultry farms are raised to fulfill the demand of the metro-city. Major pockets of the poultry are located in Dobilla, Hemja, Pame, Sisuwa, Arghaun, and Rajako-Chautara. A total of more than 100 big layer farms having more than 5000 birds, 600-700 farms with less than 5000 birds and, 3000 -3500 broiler farms (less than 500 birds), four local chicken farms with about 5000 chickens and 10 duck farms with more than 500 ducks are raised in Kaski district.

Estimated commercial layers population is 525 thousand and produce about 1 crore and 26 lacs eggs in one month, whereas about 1152 thousands of broilers are raised by the farmers in one slot (2 months). There is no hatchery to produce broiler or layer DOCs. 15 small hatcheries running in the district are producing Giriraja chicks (20,000) and distributing per week. Of the total DOC produced only 20-30 % chicks are distributed within the district. It has been estimated that a total of 80 -85 thousand local poultry chicks are produced in a month by Machhapuchre hatchery. Comercial chicks are imported from Chitwan district.

Major diseases of poultry commonly recorded are ND, IB, IBD, CRD, and Salmonella infection, *E. coli*, LPAI and Colibacillosis. Risk based surveillance or regular surveillance of these diseases is limited after implementation of new government structures.

b. **Traders**: Number of traders and input suppliers involved in the district: Poultry production is also guided by the input supply and trading, and trading is dependent on price, market demand and production volume as in other districts. Number of traders also vary by season and market demand. In Kaski, only 55 traders are found involved for day-old- chicks (DOC) and finished poultry supply. A total of 25 eggs suppliers and 20 of 51 agro-vet suppliers provide live vaccine to the farmers and 3 slaughterhouses are found in the district, but many fresh houses are slaughtering more than 100 birds/ day.

c. Imports/ collection by the district

(1). Poultry collection and major entry points: As stated in case of other districts, hatcheries, feed millers, agrovets have their own networks in the country. Major entry and exit points of poultry for Kaski district are Nayapul of Parbat district, Kupinde of Syanja district in the west and Kotre of Tanahun district in the eastern side. Traders of Kaski collect 2400- 4000 layers from farmers of Tanahun and 10,000 finished broilers come from Syanja per week. This district also imports spent hens mainly from Nabalparasi, Chitwan districts and then from Morang, Rupandehi and Dang districts. Likewise, maximum broiler chicks are collected from Chitwan and Kathmandu. But, during the shortage, finished broilers are collected from Gorkha, Tanahun, Nawalparasi, Palpa, and Dang districts and also from India via Parsa and Rupandehi districts.Identified informal route of poultry entering Kaski district is Begnas Tal route, from which point both commercial and local poultry enter to this district without health certificates.

Despite of producing more than 4 lacs 73 thousand broiler DOCs / week in the district (actually owners of Kaski have one big hatchery in Syanja and other in Gorkha district producing 200 thousand layers chicks each per week), if there is excess DOC production in Kathamndu, Bhairahawa and Chitwan, more chicks comes form Kathmandu valley (n= about 20000), secondly from Bhairahawa and thirdly from Chitwan at low cost. Near about 7000 and 21 000 DOCs are estimated to come in Kaski via Syanja and Tanahun respectively per week with a cumulative figure of 40-41 thousand per week.
Maximum backyard poultry chicks come mainly from Nawalparsi and Chitwan districts; 2500 chicks/ week from Bhaktapur district, whereas adult local poultry are mostly come from Jhapa and Nabalparasi districts. Traders claimed that 500 ducks and 300 turkeys come every day in the district from Terai districts.

(2). Eggs importation: Kaski district imports eggs from various districts viz 21000 per day from Chitwan, 16800 per day from Dang, 42000 per day from Syanja, 33600 per day from Gorkha and 18900 eggs per day from Tanahun district. Eggs so collected from various districts are further distributed to other districts as per demand.

(3). Vaccine importation: Regarding the vaccine supply, agro-vets having cold chain facilities buy all types of live poultry vaccines (e.g. ND, IBD, AIB, ND+IB, AE, MD, Lasota, Fowl Pox, etc.) required for both layers and broilers from the superstockists of

Kathmandu valley and distribute to the poultry farmers as per vaccination schedule given by hatcheries as it is practiced in other districts. Occasionally, very small volume of live vaccines comes from Chitwan too.

(4). Feed and feed ingredients: Kaski does not have any feed mill to produce feeds for commercial boilers and layers. As per traders, importation of readymade feed from various districts seems to be tentatively 6000 MT per month (Biratnagar = 65 MT, Chitwan = 80 MT, Parsa = 20 MT, Rupandehi= 10 MT, and Makwanpur =15 MT and other districts = 10 MT per day of the total volume). Two small feed mills produce feeds for local/ backyard poultry. None of the participants could estimate the actual volume of feed ingredients imported in a month by the feed millers to prepare poultry feed in the district. But they estimated that out of the toatl volume imported into the district, 65 % of feed ingredients come from Parsa or Indian side, 30% from Rupandehi and 5% from Banke district (Kohalpur). Actual volume of different ingredients to be imported per month may vary from season to season.

(5). Live poultry Market: Commercial poultry is directly transported from farm to the slaughtering places as practiced in other districts. There are no organized poultry markets/ *hat bazaar* in this district too but culled or spent hen and local poultry are marketed at Prithivi Chowak, Mustang chowak, Chipledhunga, Ranipauwa, Sital Devi, Baglung bus park area, Lekhanath chowak, Talchowak and Bagar areas.

(6). Meat importation: Kaski imports dressed meat from Chitwan and Kathmandu valley.

(7). Manure importation: No manure is brought to Kaski from other districts. Manure so produced in the district is mostly used within the district.

d. Movement/ Supply/ export from Kaski district

Movement of poultry, eggs and related inputs seems to be very complex in and outside the districts as it is seen in Kathmandu valley.

(1) Poultry, DOC, eggs and feed and vaccine supply

Occasionally, 7000 - 10500, 14000, 10000 and 5000 adult poultry are supplied to Syanja, Parbat, Kathmandu and Rupandehi districts respectively every week. Sometimes, finished broilers are sent to slaughterhouse in Nabalparasi, for slaughtering and for further supply of dressed meat to Kathmandu. This happens when there is over production or collection of poultry in Kaski/ Pokhara.

During discussion participants could not estimate the actual numbers of DOC supplied to other districts. It was estimated that Parbat (35000-42000 /wk), Syanja (14000-21000/wk), Tanahu, Baglung, and Gorkha districts stood in 1, 2, 3, 4 and 5th position to buy chicks produced in Kaski district. Local / Giriraja DOC are supplied to many districts

such as Parbat, Baglung, Syanja, Rupandehi, Tanahun, Dhading and Makwanpur districts. Ruchi Hatchery distributes Giriraja DOC to various Eastern Terai districts including to Sunsari and Jhapa districts. Vaccine is supplied as per stocks available in the district.

Eggs supply: Interestingly, Kaski collects eggs from other districts and also supplies eggs to some districts. Of the 588 thousand total supply per week, 294 thousand eggs go to Kathmandu, 147 thousand each go to Tanahun (2 Bolero jeep/wk) and Gorkha district per week or 2352 thousand to 2520 thousand per month. Besides, small volume of eggs goes to Syanja, Palpa (2 Bolero jeep/wk), Parbat, Baglung and Myagdi (5 Bolero jeep/wk), and Rupandehi districts.

Feed and vaccine supply: Two feed mills of Kaski district supply 62 MT/month of ready-made feed for Giriraja only. For other types of birds, commercial feed is imported from Chitwan and other districts and of that 8-12 MT feed each/day is supplied to Syngja and Parbat districts, whereas 8 MT feed /day is supplied to Tanahun district by the suppliers. On an average 30,000 doses of vaccine is used per day, which is equivalent to 900,000 doses/ month.

(2) Market and Slaughterhouse/ place and meat marketing: Three poultry slaughtering plants (at Chauthe, Birauta and Mahatgauda) are running in Kaski district. These plants collect finished poultry (mostly broiler) from Gorkha, Lamjung, and Tanahun and Syanja districts for slaughtering purpose. Besides, 55 slaughtering places are slaughtering more than 100 chickens/ day in the urban area. Out of 45 MT poultry meat produced / day in the district, about 22-23 MT goes to Mustang district/ Jomsom daily. With respect to biosecurity at slaughtering places, it is satisfactory at large slaughter plants, whereas it is about 50 % satisfactory in small slaughtering places. Biosecurity status of the fresh-houses/ meat shops at China- Bridge and Bagar area is not satisfactory.

(3) Waste management/ disposal: Waste material management is a great problem in Kaski district too, except in big farms and hatcheries, as they have biological pits. Hatcheries produce sub-standard chicks as much as 5-7% of the total production and sold to pig and fish farms in free of cost. Both dead chicks and adult birds (either died during transportation or at farms) are supplied to the pig or fish farms in free of cost. If not sold, are dumped in the biological pit or on the ground. Majority of farmers dump the waste materials in their land only in case of HPAI / LPAI suspected case, but a few small holder farmers throw dead chicks or poultry in the river or canal putting in sacs.

(4) Manure supply: Kaski district supplies poultry manure to Parbat, Myagdi and Mustang districts for apple and apricot plants, but the actual volume was not clear. There is no regular supply of such manure. Movement (in - and out) of poultry and poultry products is presented in Value Chain. Mapping for Kaski **(**Figure -12) and value chain diagram in Figure -13.

Incoming and outgoing routes of poultry products

Kaski is not only second hub of poultry production but also acts as a collection centre for poultry and poultry products. This district most frequently imports different poultry and poultry products from Chitwan, Rupandehi, Nawalparasi, Gorkha, Syangja and Kathmandu districts. Such commodities also come from Dang, Morang and Parsa districts in moderate frequency (Table -11). Out of four major routes used by the traders, route number 1 and Jhapa - Chitwan route of route number 2 are more frequently used.

Poultry Value Chain Mapping for Kaski District

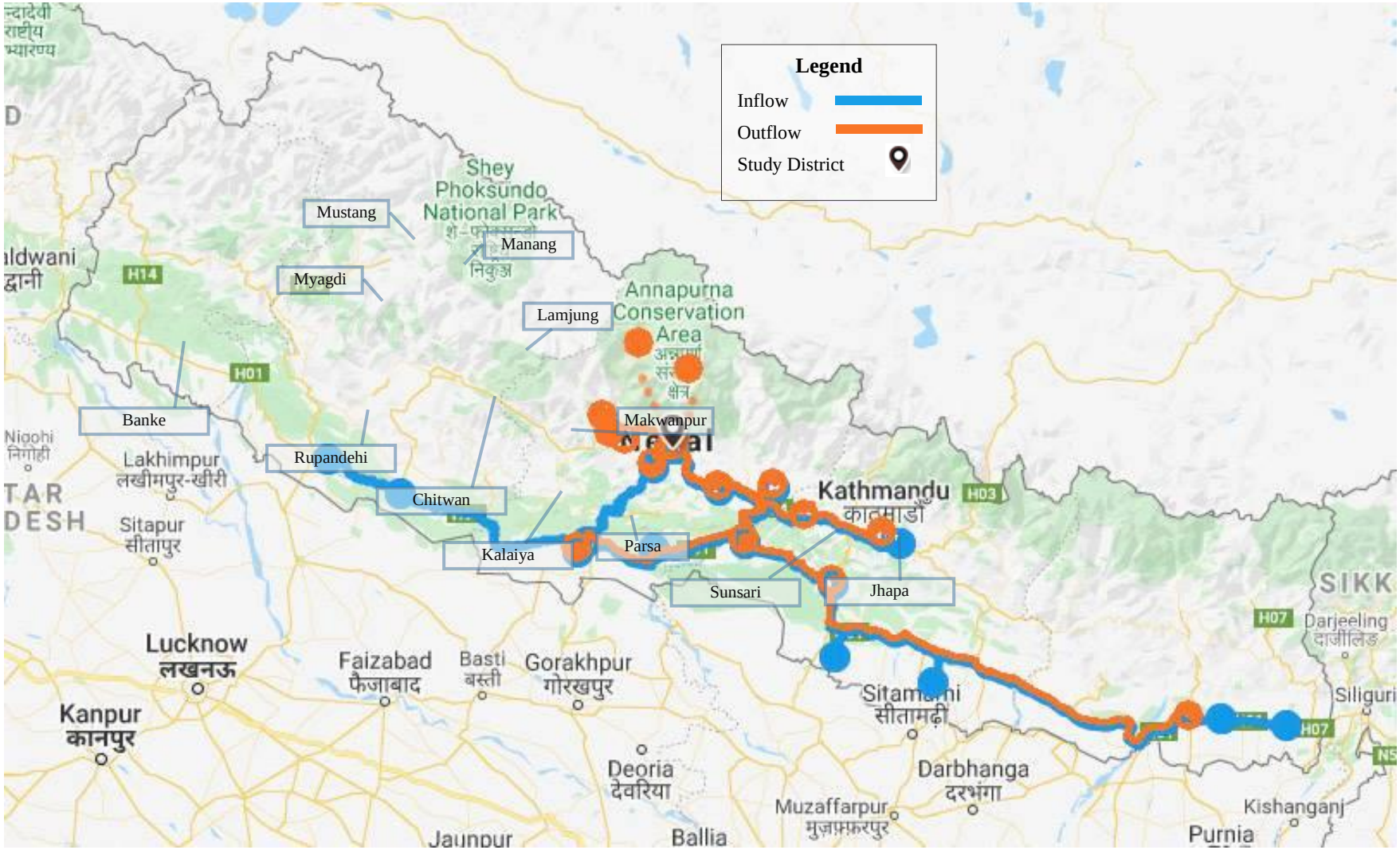


Figure 12: Movement of poultry and poultry products to and from Kaski district

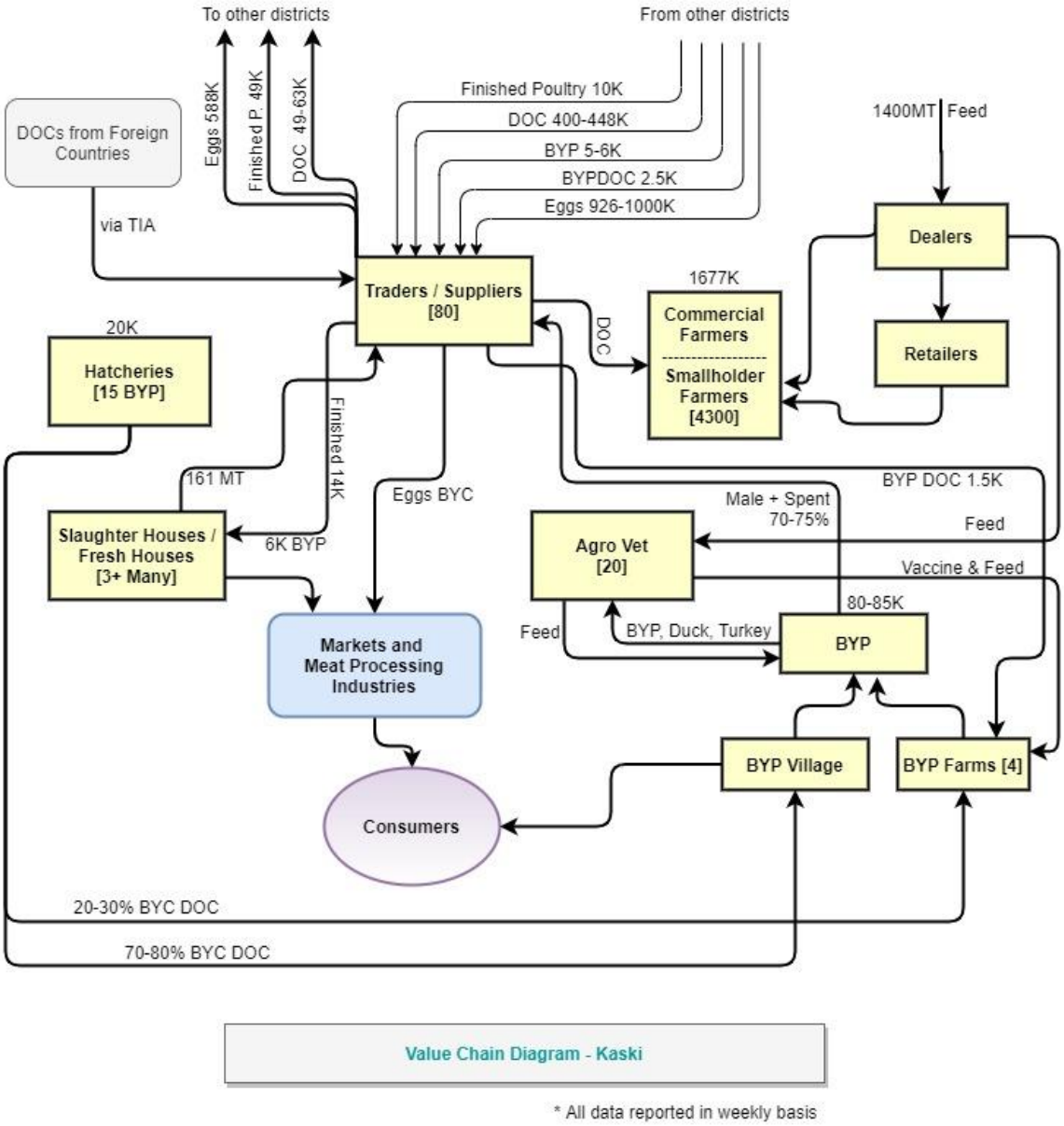


Figure 13 - Value Chain Diagram - Kaski

Table 11: Incoming routes of poultry and poultry products

Sorted by frequency		Sorted by Routes	
Top	Chitwan	**Route 1**	Gorkha
	Nawalparasi		Tanahun
	Rupandehi		Kathmandu
	Tanahun		Bhaktapur
	Kathmandu	**Route 2**	Chitwan
	Gorkha		Makwanpur
	Syangja		Parsa
Moderate	Parsa		Bara
	Morang		Morang
	Dang		Jhapa
Low	Banke	**Route 3**	Syangja (Butwal to incl Siddhartha Hw)
	Bara	**Route 4**	Nawalparasi
	Bhaktapur		Rupandehi (via Bharatpur to include EW hw)
	Jhapa		Dang
	Makwanpur		Banke

Based on the frequency of the movement, 5 districts are identified as top and 3 districts fall under moderate category. Major 5 outgoing routes have been identified for Kaski district, of which route number 1,2 and 4 are frequently used for the transportation of huge quantity of different commodities (Table -12).

Table 12: Outgoing routes of poultry and poultry products

Sorted by frequency		Sorted by Routes	
Top	Parbat	**Route 1**	Tanahun
	Syangja		Gorkha
	Tanahun		Dhading
	Baglung		Kathmandu
	Gorkha	**Route 2**	Chitwan
Moderate	Kathmandu		Makwanpur
	Rupandehi		Sunsari
	Sunsari	**Route 3**	Syangja
Low	Chitwan	**Route 4**	Parbat
	Dhading		Baglung
	Makwanpur		Myagdi
	Mustang		Mustang and Manang (via Air)
	Myagdi	**Route 5**	Rupandehi

Critical control points:

Based on the en-route mixing, critical control points for Kaski district are Kotre (Tanahun), Parbat- Kaski border and Begnas Tal route and backyard poultry, while suppliers, local poultry markets and BYP can be considered as the CCPs for this district.

10.5.1 Farmers' practice in Kaski

Movement of poultry and eggs

During the study, FGD was conducted with the key farmers of the district. When farmers experienced that outbreak of poultry diseases occur due to exchange of poultry or eggs from other farms, none of the farmers are bringing any poultry or eggs from other farms as explained by the farmers of other districts, as they said, rather sell eggs and finished birds directly to the major markets or to suppliers. The poultry farm owners do not bring any poultry or raw eggs from market/ dealer or retailer.
If the broiler farm owner needs some eggs to feed to their children or for household use they bring eggs directly from the market or even from other poultry farm and consume. Similarly, commercial layer keepers buy broiler chickens either from market or from broiler farm which is nearby. They are aware of the risk of cross contamination in the farm with egg-shells, if not disposed properly, but majority of rural farmers are not aware of the risk of contamination through feathers.

a. Inputs and product transportation system/ Movement of vehicle and /or service provider

Feed suppliers located at different locations/markets in the districts are supplying poultry feeds to the farmers on route basis. Means, feed is dropped in linear basis.
Movement of vehicle, feed/ feed ingredients and service provider in the farms are restricted and they can reach up to the farm gate only. If service provider has visited to other farm just before coming to the new farm, such individual is not permitted to enter the farm. If there is no outbreak of disease, service provider/ input suppliers/ go out from one farm to another occasionally. But, during the disease outbreak, no vehicle or service provider goes from one farm to other farm or market without proper disinfection.
Most of the layer farmers have contracted veterinarian or one technician each and the contractors visit the farm on weekly basis.

b. Movement of farm machineries/ equipments and accessories (used egg-tray, crates and sacs)

It has been noted that except debeaking machine no machineries, equipments, accessories are shared with other farms. Debeaking machine is not always sprayed with disinfectants. Farm vehicle is disinfected by the farmers when it is moved. Regular disinfection of vehicle is well practiced during the disease outbreak, but not practiced all year round.

Regarding the reusing of egg-try, crates and sacs, some farmers bring old trays in lower price and disinfect before use. Farmers sell other worthless items to *Kawadi* located at different locations of the district.

c. Movement of poultry feed / feed ingredients within the farmers

Like in Kathmandu and Chitwan valleys big farmers of this district neither borrow nor lend feed from other farms. Small farmers do practice feed exchange during feed crisis situation or during *Nepal banda*. The feed used in such condition will always be of the same feed company.

d. Waste management/ disposal:

As explained in the traders section.

e. Movement of poultry manure/ wet litter

Some farmers of Kaski district bring poultry manure from poultry farms of Chitwan district and use in their land in particular season, but they never bring manure from the markets or from other farms which are nearby. In some conditions, neighbor may use manure from other farms if their land is nearby other's poultry farm. Poultry manure produced in the district is supplied to Mustang and Myagdi districts.

f. Transporter's situation:

The practice of transportation of poultry, DOC, eggs and feed is found similar to that found in Chitwan district.

10.5.2. Key informants' response

During the discussion traders, farmers and KI of Kaski district have identified the major problems and suggested key points to improve the situation of the poultry industry (see Annex -9):

10.6 Jhapa district

a. **Poultry production and poultry products in Jhapa district:** Jhapa district is rich in dairy and poultry industry. Major pockets of broiler poultry are located in Kankai, Garamani, Bhadrapur, Birtamod, Budhabare, Arjundhara, Gauradaha, Haldibari, Maharani- Jhoda, Kecha kewal and Damak, but Damak is considered as the major pocket of layers. Only three farms are producing parent stock chicks. A total of 26 registered and 124 non- registered layer farms having more than 5000 birds and more than 360 reistered broiler farms less than 5000 birds are located at different locations and around 700 broiler farms less than 500 birds are scattered at various locations. Total 50 local chicken farms of different capacity and 10 -12 duck farms with more than 200 ducks are present in the district.

Estimated commercial layers population is 450 thousand and produces about 1695 thousand eggs in one month, whereas about 500-600 thousand broilers are raised by the farmers in one slot (2 months). Kankai hatchery, Bhatbhateni International hattchery are producing commercial chicks (broiler, layers) in the district. Local and Giriraja chicks are produced by a hatchery located at Damak. One registered Quail farm was identified during discussion. These hatcheries producing more than 100 thousand chicks per week (Kankai hatchery - 44000 and Bhatbhateni Int'l hatchery - 56000 plus) and distributing in and out of the district. The number of DOC production may rise to 150,000 when DOC of local poultry is added. There is seasonal variation in the chick distribution. In general, of the total DOC produced in the district, only 20-25 % chicks are distributed within the district. Rest DOCs are distributed in Ilam, Panchthar, Taplejung, Morang, Sunsari, Dhankuta and Udaypur. It has been estimated that a total of 200 thousand local poultry is produced in a year.

Major diseases of poultry commonly recorded are IBD, CRD, Salmonella infection, ***E. coli***, LPAI and Colibacillosis, ND, IB and HPAI. Risk based surveillance or regular surveillance of these diseases is not practiced after implementation of new structures by the government. Only passive surveillance is on-going.

b. **Traders**: Number of traders and input suppliers involved in the district: Poultry production is also guided by the input supply and trading, and trading is dependent on price, market demand and production volume as in other districts. Number of traders also vary by season and market demand. In Jhapa, more than 100 traders are found involved for day-old- chicks (DOC) and poultry supply. A total of 40 eggs suppliers and 12 out of 144 agro-vet suppliers provide live vaccine to the farmers and 15 poultry slaughtering places (especially in Birtamod area) are found in the district, which are slaughtering more than 100 birds/ day.

c. Imports/ collection by the district

(1). Poultry collection and major entry points: As stated in case of other districts, hatcheries, feed millers, agrovets have their own networks in the country. Major entry and exit points of poultry for Jhapa disrtict are Kankadvitta- West Bangal, Bhadrapur- West Bangal, Ilam and Toribari - Morang along the highways. Limited numbers of layers enter into the districts from other districts. More than 72 Km long Indo- Nepal border with Jhapa district seems to be a complex issue to spellout actual number of informal routes. However, identified informal routes of poultry entering to Jhapa district during discussion are Bahundani, Nakkalbanda, Jyamire gadhi, Kumarkhod, Kechnakewal, Pathamari, Gherabari, Mechinagar, Jhapa baazar, Degal Bank, Surunga, Laxmipur, Sarnamati, Gaurigunj and South of Hulaki marga. It is said that local chicken, chicks, white eggs and vaccines enter from Kankadvitta area and Kechnakewal, whereas DOC, local poultry and some white eggs enter daily from Gaurigunj area, but the security personnel on duty at all border check points replied that no poultry, poultry products or white eggs come from the check point, but it is very difficult to control such importation completely due to open border. Price difference, availability and socio-cultural practice are considered as the

prime factors for the movement of poultry, poultry products and feed ingredients along the border areas. As per discussion, Kumarkhod, Kechnakewal, Pathamari, Sarnamati and Gaurigunj area are the high-risk area of this district. In most cases DOC, feeds, medicines and vaccines are supplied form one door like in other district, and when the poultry or eggs are ready to be marketed, farmers sell their products to the same supplier who supplies them feed, medicine, chicks etc.

Despite of 2 +1 (two commercial and one local breed) hatcheries in the district, 75000 broiler DOCs are brought from Kanchan, Pashupati, Abhinas, Biju and New Pashupati hatcheries per week in the district in which Chitwan, Morang and Siraha districts are the first, second and third level suppliers by the volume. Likewise, 2500-3000 broiler chicks per week are informally imported from India, although some broiler chicks come from hatchery of Siraha district. Some brooded chickens are imported from Kaski, Pokhara. It is very interesting to note that adult local poultry daily go to Kaski from this district. Culled birds and spent hens are brought from Ilam and Taplejung.

(2). Eggs importation: Only some eggs are collected from Taplejung and Ilam, when egg production in those districts is high.

(3). Vaccine importation: Regarding the vaccine supply, agro-vets having cold chain facilities buy all types of live poultry vaccines (e.g. ND, IBD, AIB, ND+IB, AE, MD, Lasota, Fowl Pox, etc.) required for both layers and broilers from the superstockists of Kathmandu valley and distribute to the poultry farmers as per vaccination schdule given by hatcheries as it is practiced in other districts. Vaccines so supplied are mostly manufactured by Nepal and Bangladesh.

(4). Feed and feed ingredients: As per traders, 240 MT of readymade feed is brought in the district per month and this volume of feed is marketed by Triveni, Shakti Feed, Uttam Feed and Sun Feed industries located at Chitwan, Rupandehi, Parsa, Morang and Sunasari districts. Three Feed Mills (Star Feed, Bhadrapur Feed and Valley Feeds) of this district import 1125 -1500 MT of feed ingredients in a month to prepare poultry feed depending on the demand of the feeds, of which 400-500 MT each come from Morang and Sunsari districts, whereas 300- 400 MT come from Parsa district. But 75% of feed ingredients come from India and USA. Animal Quarantine record indicates that 17.11 MT of bone meal was imported from Bhadrapur and 45 MT from Kankadvitta AQCP. Feed is transported by full body truck in the highway and by Bolero or jeep in hilly districts.

(5). Live poultry Market: Commercial poultry is directly transported from farm to the slaughtering places as practiced in other districts. There are no organized poultry markets/ *hat baazar* in this district too but culled or spent hen and local poultry come to the market from Ilam, Panchthar districts and from India. In Damak, poultry market runs on Thursdays and Mondays every week. From that market, local poultry is sent to Kathmandu on Fridays and Tuesdays.

(6). Meat imports/ collection: No dressed meat is collected from other districts.

(7). **Manure importation:** Poultry manure is collected from Morang, Sunsari and Chitwan district during vegetable and cropping seasons. Participants could not estimate the volume of import.

d. Movement/ Supply/ export from the district

(1) Poultry, DOC, eggs feed and vaccine supply: Finished poultry is supplied to Dang, Kaski, Kathmandu, Morang, Ilam, Taplejung, Panchthar, and Dhanakuta and Sakhuwasabha districts. Such supply of poultry is not regular, but during major festivals. Backyard poultry, at least 1000 in number, is sent to Kathmandu per week. When the broilers are not collected by the suppliers, farmers send unsold broilers to any other districts wherefrom demand arises.

During discussion actual number of poultry and DOC exported/ supplied to other districts could not be estimated, although the districts or state where they are sent were identified as Morang, Sunsari, Saptari, Udaypur and Siraha in the west and Ilam, Panchthar, Taplejung and Sikkim (India) in the north-east.

Eggs supply: Out of 1695 thousand eggs produced in a month in the district and some eggs collected from neighboring districts, almost half of the total volume (800 thousands) eggs are sent to other districts in a month. Ilam, Panchthar and Taplejung district import more eggs in a month, whereas Morang imports relatively less volume, and Saptari, Siraha and Udaypur districts import very less number of eggs from Jhapa. During crisis, small volume of eggs is sent to Kathmandu.

Feed and vaccine supply: A total of 1740 MT of feed is made available in the district per month. Out of this total volume, about 1200 MT feed is supplied to Ilam, Panchthar, Taplejung, Morang, Sunsari, Saptari, Siraha and Udaypur districts. Sometimes feed goes to Chitwan and Kathmandu too. Maximum volume is supplied to Ilam, Panchthar, and Taplejung when compared to Morang, Saptari, Siraha and Udaypur districts. On an average 30, 00 thousand doses of vaccine is used in a month in both broiler and layers.

(2) Market and Slaughterhouse/ place and meat marketing: Parties involved in the slaughtering and dressing of backyard poultry collect 7500 birds in a month (250 birds/ day). They sell such meat within the district. Biosecurity status in these slaughtering places is found poor. These slaughtering places are generally called as fresh houses.

(3) Waste management/ disposal: Waste material management is a great problem in Jhapa district too, except in big farms and hatcheries, as they have biological pits. Hatcheries produce sub-standard chicks as much as 7% of the total chick production and sold to pig and fish farms in free of cost. Both dead chicks and dead adult birds (which die during transportation or at farms) are also supplied to the pig or fish farms in free of

cost. If not sent to pig farms, such chicks or birds are dumped in the pit dug in their land. Dumping is well practiced in case of HPAI / LPAI suspected case.

(4) Manure supply: Jhapa district supplies poultry manure to Ilam and Shantinagar on seasonal basis. There is no regular supply of such manure. Movement (in - and out) of poultry and poultry products is presented in Value Chain. Mapping for Jhapa **(**Figure -14) and value chain diagram in Figure -15.

Incoming and outgoing routes of poultry products

Considering the open border of 72 Km with India and more than 5 major entry points chances of mixing up of infected poultry or poultry products seems to be very high. As Jhapa is the center point for the movement of poultry and its products from or to hilly districts in-route mixing is probable. Besides, poultry go to this district even from Kathmandu, Chitwan and Morang almost regularly (Table-13). Route number 5 and backyard poultry from route 2 can be considered as the most vulnerable routes for this district.

Poultry Value Chain Mapping for Jhapa District

Figure 14: Movement of poultry and poultry products to and from Jhapa district

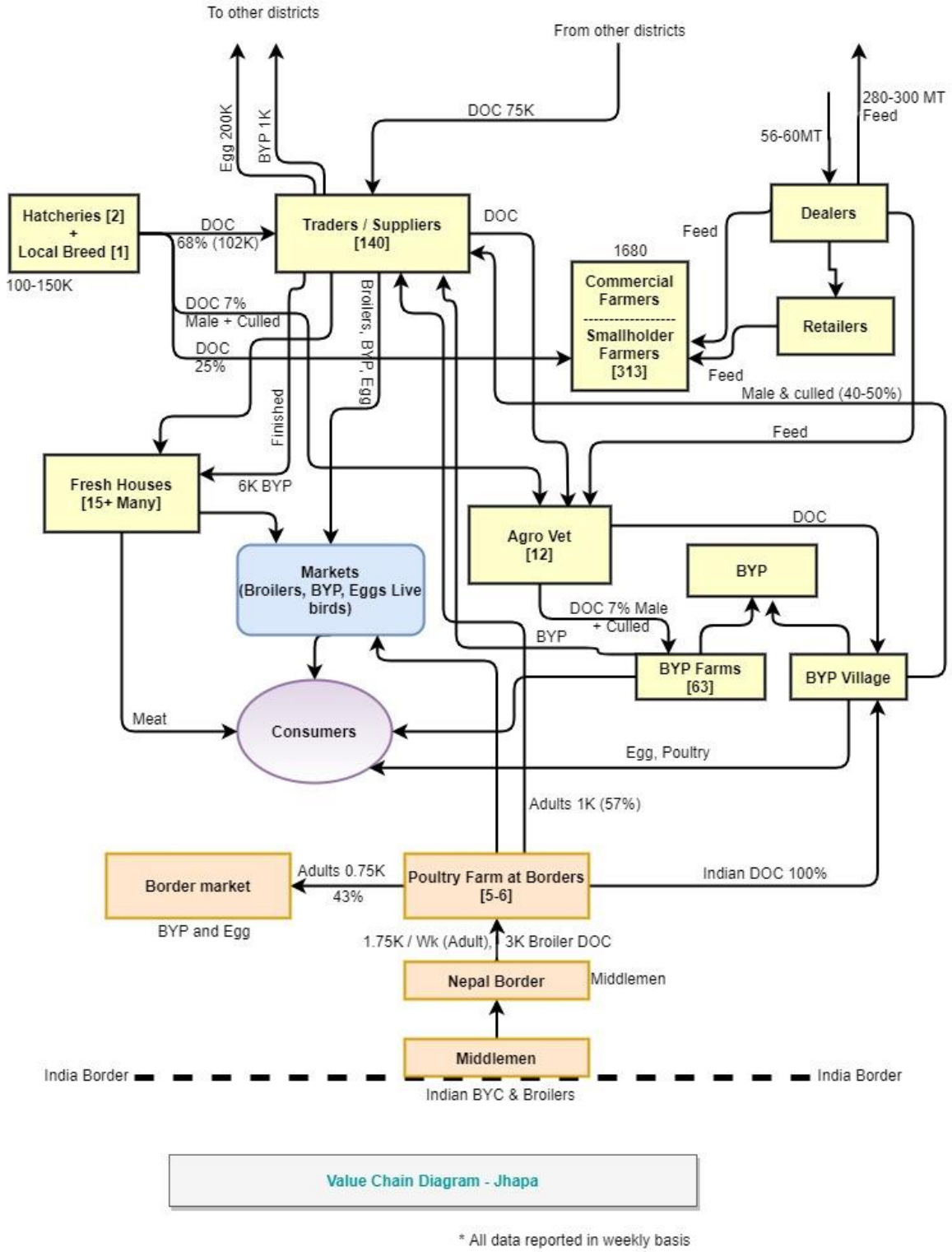


Figure 15 - Value Chain Diagram – Jhapa

Table 13: Incoming routes of poultry and poultry products

Sorted by frequency		Sorted by Routes	
Top	Morang	**Route 1**	Morang
	Chitwan		Sunsari
	Sunsari		Siraha
	Kathmandu		Parsa
Moderate	Taplejung		Chitwan
	Ilam		Kathmandu
	India	**Route 2**	Taplejung
Low	Kaski		Panchthar
	Panchthar		Ilam
	Parsa	**Route 3**	Kaski
	Rupandehi	**Route 4**	Rupandehi
	Siraha	**Route 5**	India (via Mechinagar)
			India (via Kechankawal, Kumarkhod, Sarnamati, Gaurigunj, etc)
			India (via Gaurigunj)
		Route 6	Added a route via Sindhuli Highway

Poultry and its products move from this district in different directions and Provinces (e.g. to Dang, Kaski, Chitwan and Kathmandu). Backyard and spent hens collected in Thursday and Monday Hat Baazar at Damak go out of the district twice a week. Two-ways movement of poultry occurs in the hilly districts (Table -14).

Table 14: Outgoing routes of poultry and poultry products

Sorted by frequency		Sorted by Routes	
Top	Taplejung	**Route 1**	Taplejung
	Ilam		Ilam
	Panchthar		Panchthar
	Morang		Sikkim (India)
	Saptari	**Route 2**	Morang
	Siraha		Saptari
	Udaypur		Siraha
	Kathmandu		Sunsari
	Sunsari		Udaypur
Moderate	Chitwan		Kathmandu
	Sankhuwasabha		Chitwan
	Sikkim	**Route 3**	Dhankuta
Low	Dang		Sankhuwasabha (Khandbari)
	Dhankuta	**Route 4**	Kaski
	Kaski	**Route 5**	Dang

Critical control points:

Based on the in-route mixing of the poultry, critical control points for Jhapa district are backyard poultry coming to Damak market and municipalities from hilly districts, backyard and commercial poultry coming from bordering areas as mentioned above and local markets. Other most vulnerable CCPs are traders, suppliers and Indo- Nepal bordering points.

10.6. 1 Farmers' practice in Jhapa

Movement of poultry and eggs:

During the study FGD was conducted with the key farmers of the district. When farmers experienced that outbreak of different poultry diseases including HPAI and LPAI time to time year to year, but there is free movement of live poultry and eggs from farm to farm and hence eggs or dressed poultry or even live poultry may go to farms either from individual farm or from market. They also bring poultry from rural areas and place nearby commercial poultry farm. Sometimes they sell poultry or eggs to other farms. Majority of farmers are found unaware of the risk of cross contamination in the farm with such poultry, eggs or feeds but majority of rural farmers are not aware of the risk of contamination through feathers.

a. Inputs and product transportation system/ Movement of vehicle and /or service provider

Feed suppliers located at different locations/markets in the districts are supplying poultry feeds to the farmers on route basis. Means, feed is dropped in linear basis. Vehicles coming from Chitwan and Jhapa come to their farm to supply inputs. If there is no outbreak of disease, service provider/ input suppliers/ go out from one farm to another occasionally. But, during the disease outbreak, no vehicle or service provider goes one farm to other farm or market without proper disinfection. Daily disinfection of vehicle is rarely done.
Most of the layer farmers have contracted veterinarian or one technician each and the contractors visit the farm on weekly basis. Such people complete their tasks in linear basis without taking proper precautions.

b. Movement of farm machineries/ equipments and accessories (used egg-tray, crates and sacs)

Debeaking machine is not always sprayed with disinfectants. Regular disinfection of vehicle is well practiced during the disease outbreak only, but not all year round.
Layer farms sell egg-try, crates and sacs to the markets. Some farmers buy old trays and crates in lower price and disinfect before use. Farmers sell other items of less worth to *Kawadi* located at different locations of the district.

c. Movement of poultry feed / feed ingredients within the farmers

Readymade feed exchange is generally practiced in the district.

d. Waste management/ disposal:

As explained in the traders section.

e. Movement of poultry manure/ wet litter

Farmers also send manure to Ilam directly. But none of the farmers send poultry manure to the market.

f. Transporter's situation:

Hatcheries and Feed Mills having their own vehicle use their vehicles for the transportation of DOCs or feed. Otherwise every item is transported by suppliers. Suppliers provides vehicle to transport poultry, DOC and feed. Some vehicles are washed by detergent -water, but rest is washed just by plain water daily. Vehicle coming from Chitwan district directly reach to Jhapa, Ilam, Panchthar and Taplejung district. In-route drop is based on the demand of the farmers. One vehicle generally carries 11400 DOC in one trip.

10.6. 2. Key informants' response

During the discussion traders, farmers and KI of Jhapa district have identified the major problems and suggested some of the important points to improve the situation of the poultry industry (see Annex- 9)

Note:
1. Poultry coming from outside go to eastern hilly districts directly, Kathmandu and Morang; sometimes may go to many districts. Due to imbalance in market, some broiler farmers have to keep up to 74 days old broilers and they are compelled to sell their stocks to any other districts.
2. Local government is involved in the process of regulating poultry supply.
3. Except for some information obtained from AQCP, Government Officials and security personnel have no data or information regarding the movement of poultry, poultry products and poultry feed. Recording of such movement by security people has been stopped by the local government.
4. Single vehicle is used for the transportation of chicks, feed, eggs, etc.

10.7 Sunsari district

a. Poultry production and poultry products in Sunsari district. **Sunsari** district is bordering with India. Major pockets of poultry (broiler and layers) are located in Tarahara, Inaruwa, Bokraha, Gadhi, Baraha, Duhabi and Dharan. A total of 75- 80 big (>1000 layers) and 342 small layer farms, 5 parent stock farms and more than 500 broiler farms are running at different locations. Total strength of layer poultry is estimated to range from 200 -250 thousand which produce 3375 thousand eggs per month (assuming that 60% of population at productive stage with averageof 75% egg

production/day). Total 500 broiler farms having more than 300 birds produce 120,000 - 150,000 broilers in two months. Total 4 local chicken farms of different capacity produce 23300 birds. Backyard chickens and roughly 10 -20 ducks are kept in each house of Tharu household. Five hatcheries (Satya Sai, Saptakoshi, Itahari hatchery, Purbanchal hatchery and B and B hatcheries) and 3 very small-scale hatcheries produce 60,000-70,000 commercial DOC per week (240,000- 280,000 chicks/month). Utsab hatchery only produces around 8400 chicks per month.

Major diseases of poultry commonly recorded are RD, IB, IBD, CRD, *E. coli*, LPAI, HPAI and Colibacillosis as it is recorded in Jhapa district. No risk-based surveillance or regular surveillance of these diseases has been practiced after implementation of new structures by the government. This district is facing recurrent outbreak of HPAI.

b. Traders: Number of traders and input suppliers involved in the district: In Jhapa, more than 100 traders are found involved for day-old- chicks (DOC) and poultry supply. A total of 100 eggs suppliers and 50 of 104 agro-vet suppliers provide live vaccine to the farmers. 25 poultry slaughtering places, especially in Dharan (n=10) and Itahari (n =10), Duhabi (n= 3) and Khanar (n= 2) area) are found in the district, which are slaughtering more than 100 birds/ day.

c. Imports/ collection by the district

(1). Poultry collection and major entry points: As stated in case of other districts, hatcheries, feed millers, agrovets have their own networks in the country. Major entry and exit points of poultry for Sunsari disrtict is Jhurkiya- Urlabari, Bhantabari, Baraha kshetra and Bhedetar - Dhanakuta along the highways. Like in the Jhapa district, Sunsari district has got many informal routes to enter poultry and eggs in the district. However, participants identified major informal routes for entering poultry to this district as Ghuski, Kaptangunj, Dewangunj, Haripura, Laukahi, Bhatabari and Narsing. Among them Ghuski, Kaptangunj, Laukahi and Bhatabari areas are considered as very risky areas in view to disease transmission. Around 100 people are involved in these places in such importation. It is said that a particular ethnic grop is active in informal importation. Field observation seems that there is motorable road in every 100m distance in Ghuski, which is favourable for informal entry during off hours. Around 400-500 backyard chicken and 400-500 white eggs enter from Laukahi and Kaptangunj area daily and are sold locally. Similar volume of chicken and eggs enter from Ghuski and sell locally, but the security personnel on duty at all border check points were found reluctant to explain the actual situation, however, they said that it is very difficult to control such importation fully due to open border, price difference, availability of market and socio-cultural practice in the bordering areas. Besides, 22-25 registered poultry farms are found in Dewangunj and 6 such farms in Ghuski area and they are acting as a collection centers for informal imports of poultry.

More than 6750 backyard poultry including spent hens (From Chitwan =5000, Jhapa =350, Morang =1200 and Dhankuta = 100/ wk, Sirah = 100/wk) are collected weekly by this district. In some case, local poultry also come from Ilam district. Around 14000 broilers per month (3500 /week) come from Morang, whereas 100 and 120 spent hens come to Sunsari from Udayapur and Dhankuta per day respectively.

In most cases DOC, feeds, medicines and vaccines are supplied form one door like in other district, and when the poultry or eggs are ready to be marketed, farmers sell their products to the same supplier who supplies them feed, medicine, chicks etc. as it is practiced in other districts. Tentatively, 73000 DOCs are imported per week from other districts (From Chitwan = 50,000, Moran =10,000, Jhapa = 5000, Kathmandu = 5000, Pokhara =2000, Sarlahi = 1000 per week) and distributed in the district and hilly districts. DOC suppliers are Abhinas, Biju, New Pashupati, Om Shree Pashupati, Pathibhara, Kankai and Hill bird hatchery.

(2). Eggs importation: Record or estimation of importation of eggs was not made available during study, but it was explained that about 1200 duck eggs are coming from Morang district in every week.

(3). Vaccine importation: Regarding the vaccine supply, agro-vets having cold chain facilities buy all types of live poultry vaccines (e.g. ND, IBD, AIB, ND+IB, AE, MD, Lasota, Fowl Pox, etc.) required for both layers and broilers from the superstockists of Kathmandu valley only and distribute to the poultry farmers as per vaccination schedule given by hatcheries, as it is practiced in other districts. Vaccines are supplied to Jhapa, Ilam, Taplejung, Panchthar, Sankhuwasabha, Dhanakuta, Udayapur, Saptari and Siraha districts.

(4). Feed and feed ingredients: As per traders, readymade feed is brought in the district per month and feed is marketed by Nuova Feeds, Shakti pellet Feed, Asian Feeds, Poshak feeds and Well Hope Feeds industries located at Chitwan, Morang and Jhapa districts. Five Feed Mills (Sagar Feeds, Purbanchal Feeds, Sun Feeds, Koshi Feeds and Chandani Feeds) of this district import 5670 MT(29 Trucks) of feed ingredients in a month to prepare poultry feed depending on the demand of the feeds, of which 20% volume come from Morang, Jhapa, Dang and other districts of Terai. Rest 80% volume of feed ingredients come from the foreign countries (India= 60%, Bangladesh =20%). Occasionally, readymade feed come from Dang and Kathmandu.

(5). Live poultry Market: Commercial poultry is directly transported from farm to the slaughtering places as practiced in other districts. There are no organized poultry markets in this district too but culled or spent hen and local poultry come to the market from Ilam, Panchthar districts and from India. Such poultry is sold at Duhabi, Khanar, Dharan, Jhumka, Inaruwa, Laukahi, Prakaskpur and Madhuwan areas. Weekly *Hat baazar* are run at Dharan, Inaruwa, Barahkshetra, Dewangunj, Harinagara, Itahari, Jhumka, Koshi and Bhokraha.

(6). Manure importation: Poultry manure is not collected from other districts

d. Movement/ Supply/ export from the district

(1) Poultry, DOC, eggs and feed and vaccine supply: Finished poultry is sent to all hilly districts of the province and Udaypur, Sindhuli, Saptari and Siraha by Bolero Jeeps. Actual volume is not known due to lack of recording system at the check points. There is seasonal variation in the chick distribution. Out of the healthy chicks produced in Sunsari by the hatcheries 75 -80 % DOCs are distributed to Morang (20,000/wk) Jhapa (20,000), Siraha and Saptari (60,000/wk). During discussion an interesting statement came from the stakeholders that some DOCs entering to Sunsari district from Morang, Jhapa, Saptari and Siraha are supplied to Ilam, Teharathum, Panchthar and Taplejung, Dhanakuta and Sankhuwasabha and even to certain parts of Morang and Jhapa districts, but the number of DOCs so supplied could not be estimated by the participants attending the FGD or KII.

Eggs supply: Out of 844 thousand eggs produced in a week in the district and some eggs collected from neighbouring districts, about 220 thousand eggs are sent to Dhanakuta (n= 51.45 thousand), Ilam, Panchthar and Taplejung districts (n=105 thousand) and Sankhuwasabha (n= 63 thousand) in a week.

Feed and vaccine supply: Out of the total feed collected from various feed millers as mentioned above and the feed ingredients brought by the local feed millers (5670MT/month), a total of 5040 MT of feed supplied to Morang, Jhapa, Ilam, Panchthar ,Taplejung, Dhanakuta, Bhojpur,Sankhuwasabha, Udaypur, Saptari, Siraha, Dhanusha, Sarlahi, Sindhuli districts per month. Feed is supplied on weekly basis. Among these districts more feed go to Morang, Jhapa, and Saptari, while Siraha tanks second to import readymade feed from Sunsari.
On an average 40,00 thousand doses of vaccine is supplied to Morang, Jhapa, Ilam, Taplejung, Panchthar, Dhanakuta, Tehrathum and Sankhuwasabha districts in a month as per chick supply and vaccination schedule**.**

(2) Market and Slaughterhouse/ place and meat marketing: Parties involved in the slaughtering and dressing of poultry collect birds from Morang, Saptari and Siraha districts. The dressed poultry (60 MT) is supplied to Kathmandu, Dhanakuta and Tehrathum districts in a month. Biosecurity status in these slaughtering places is found very poor (25% satisfactory). These slaughtering places are generally called as freshhouses.

(3) Waste management/ disposal: Sunsari produces commercial, local, turkey, quail and Giriraja chicks per week. Chicks are graded as Grade A and B. Grade B is mixed with Grade a group in certain ratio. Grade C chicks are discarded and dumped in pits andnot sold to pig or fish farms. Waste material management is not found satisfactory in this district too.

(4) Manure supply: Sunsari district supplies 12000 -14000 MT of poultry manure in a season only to Dhanakuta Tehrathum and Sankhuwasabha districts. There is no regular supply of such manure. Movement (in - and out) of poultry and poultry products is presented in Value Chain. Mapping for Sunsari **(**Figure -16) and value chain diagram is given in Figure -17.

Incoming and outgoing routes of poultry products

Situation of incoming and outgoing routes and condition of Sunsari district is found not much different from that seen in the Jhapa district. Differences found are relatively shorter border length, entry points from Indian border (Devangunj, Ghuski, Kaptangunj, Laukahi and Bhantabari) and some hilly districts. Seven routes are identified for this district (Table -15).

Poultry Value Chain Mapping for Susari District

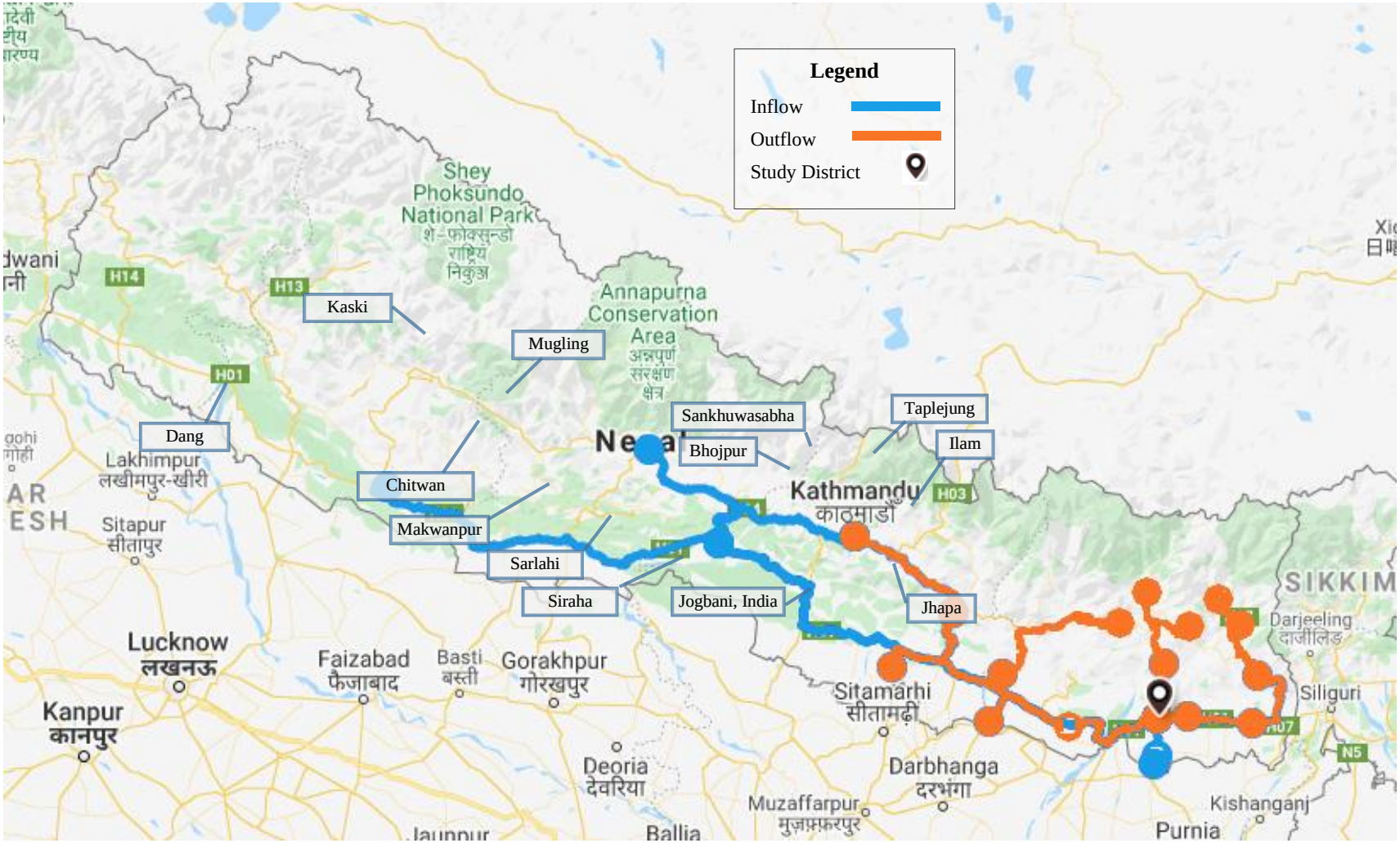
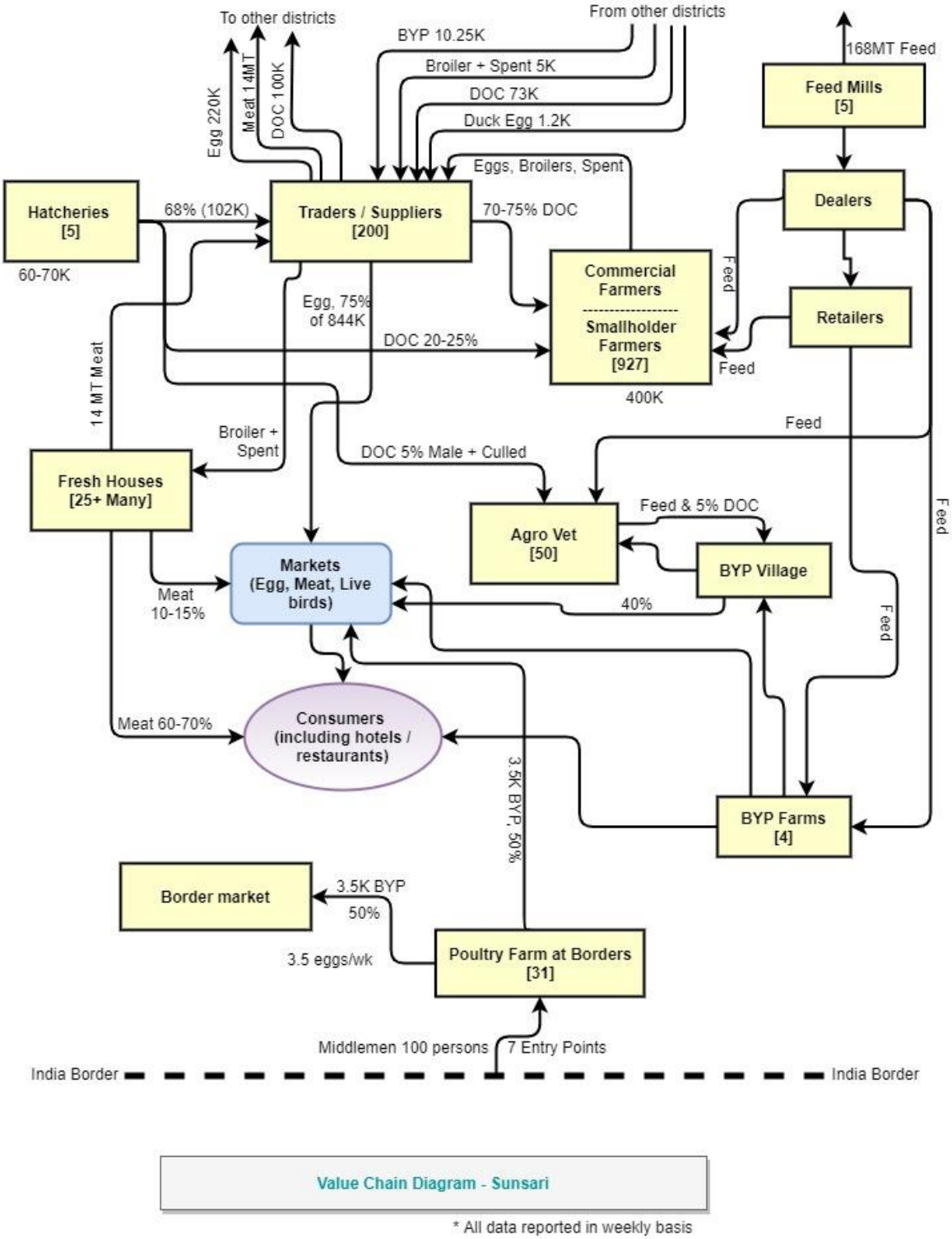


Figure 16: Movement of poultry and poultry products to and from Sunsari district



Value Chain Diagram - Sunsari

* All data reported in weekly basis

Figure 17 - Value Chain Diagram – Sunsari

Table 15: Incoming routes of poultry and poultry products

Sorted by frequency		Sorted by Routes	
Top	Morang	**Route 1**	Morang
	Kathmandu		Jhapa
	Jhapa		Ilam
	Chitwan	**Route 2**	Udaypur
Moderate	Dhankuta	**Route 3**	Dhankuta
	Dang	**Route 4**	Siraha
Low	Ilam		Sarlahi
	India		Chitwan
	Kaski		Kathmandu
	Sarlahi	**Route 5**	Dang
	Siraha	**Route 6**	Kaski
	Udaypur	**Route 7**	India (via Devangunj)
			India (via Ghuski)
			India (via Bhantabari)
		Route 6	Added a route via Sindhuli Highway

Five routes are identified for outgoing of the poultry and poultry products from this district (Table -16). Frequency and routes for the commodity movement are similar to that found in the Jhapa.

Table 16: Outgoing routes of poultry and poultry products

Sorted by frequency		Sorted by Routes	
Top	Dhankuta	**Route 1**	Morang
	Ilam		Jhapa
	Panchthar		Ilam
	Sankhuwasabha		Panchthar
	Saptari		Taplejung
	Taplejung	**Route 2**	Dhankuta
	Siraha		Sankhuwasabha (Khandbari)
Moderate	Terhathum		Terhathum
	Jhapa	**Route 3**	Udaypur
	Morang		Bhojpur
Low	Bhojpur	**Route 4**	Saptari
	Kathmandu		Siraha
	Sarlahi	**Route 5**	Sarlahi
	Sindhuli		Sindhuli
	Udaypur		Kathmandu

Critical control points:

Critical control points for Sunsar district due to en-route mixing are backyard poultry coming to the various points of the district from Jhapa, Udaypur and Dhanakuta districts, backyard and commercial poultry coming from bordering areas as mentioned above, Koshi tappu wet land where migratory birds stay from september to march and local unorganized poultry markets. Besides, Itahari chowak could be the en-route mixing point as four highways go to different directions from this point. The most sensitive CCPs are traders, suppliers and Indo-Nepal bordering points, where chickens move freely from Nepal to India and vice versa.

10.7. 1 Farmers' practice in Sunsari

Movement of poultry and eggs:

Sunsari is one of the high-risk districts in view to outbreak of HPAI and other infectious poultry diseases. When farmers experienced that outbreak of poultry diseases occurring due to exchange of poultry or eggs from other farms, none of the commercial farmers are bringing any poultry or raw eggs from other farms as explained by the farmers of other districts. Almost all poultry farmers sell their products to the related suppliers. If dressed poultry or raw eggs are brought from other farms or market for consumption, big farms never introduce these items in their farms. In contrast, rural small farms have practiced exchange of poultry or eggs for consumption as majority of rural farmers are not aware of the risk of contamination through raw meat, eggs, eggshells or feathers.

a. Inputs and product transportation system/ movement of vehicle and /or service provider

Feed suppliers located at different locations/markets in the districts are supplying poultry feeds to the farmers on route basis. Direct entry of vehicle, feed/ feed ingredients and service provider in the farms are restricted by big commercial farms and such vehicle or service provider can reach up to the farm gate only. Farm vehicle is disinfected by the farmers when it is moved. Regular disinfection of vehicle is well practiced during the disease outbreak, but not all year round. If service provider has visited to other farm just before coming to the new commercial farm, such individual is not permitted to enter the farm. But this practice is not followed by all small holder farms.

If there is no outbreak of disease, feed and egg suppliers go out from one farm to another to drop feeds and collect eggs occasionally. Veterinary Service providers go to other farms or market taking some protection. Most of the layer farmers have contracted veterinarian or one technician and the contractors visit the farm on weekly basis to observe the health status and vaccinate the birds. But, during the disease outbreak, no vehicle or service provider goes from one farm to other farm or market without proper disinfection.

b. Movement of farm machineries/ equipments and accessories (used egg-tray, crates and sacs)

It has been noted that except debeaking machine, no machineries/equipments are shared with other farms. Debeaking machine is not always sprayed with disinfectants. Old machineries are never brought from the markets. Regarding the reusing of egg-try, crates and sacs, some farmers bring old trays in lower price and disinfect before use. Farmers sell other less worthy items to *Kawadi* located at different locations of the district.

c. Movement of poultry feed / feed ingredients

Like in Kathmandu and Chitwan valleys big farmers of this district neither borrow nor lend feed from other farms. Small farmers do practice feed exchange during feed crisis situation or during *Nepal banda* only to save birds. The feed used in such condition will always be of the same Feed Company.

d. Waste management/ disposal

Waste management is a problem in this district too as there is different system of poultry production. Rest points are as explained in the traders section above.

e. Movement of poultry manure/ wet litter

Broiler farms collect manure and keep on one side of the farm untill the buyer comes to the farm. Layer farms have different practice based on the system adopted. Farmers do not bring poultry manure from other farm or markets. Farmers send manure to Ilam, Udaypur, Dhanakuta, Tehrathum and Sankhuwasabha districts directly, and not to the market.

f. Transporter's situation:

Suppliers provides vehicle to transport drugs, vaccines, live birds, DOC and feed. Some vehicles are washed by detergent -water, but rest is washed just by plain water. Transportation practice seems to be almost similar to that practiced in other districts.

10.7. 2. Key informants' response

During the discussion traders, farmers and KI of Sunsari district have identified the major problems and suggested some key points to improve the situation of the poultry industry (see Annex- 9)

11. Summary of the findings of the Poultry Value Chain Study

(1). DOC imports, production and distribution

- More than 80% parent chicks are imported from foreign countries with proper documents via TIA

- About 75-80 % commercial DOC chicks (both layers and broilers) are distributed to farmers of other districts either directly by the hatcheries or through middle men , so called suppliers; 20 -25 % distributed within the district of production
- En-route drop of chicks are well practiced
- 90 % male layers DOCs are distributed in the rural areas of hilly districts
- All DOCs are vaccinated at the hatcheries of origin against RD and MD as per schedule

(2). Biosecurity at different levels of Poultry value chain

- 25-50 % satisfactory in commercial farms as per standard practice
- 75 % satisfactory in big hatcheries and less than 25% in small hatcheries as per standard practice
- Only 50 % satisfactory in big slaughter places and 25 % satisfactory in small slaughtering places
- Transporters are not much aware on biosecurity
- No biosecurity measures being applied in the borders and backyard birds
- Feed millers are not much aware of the biosecurity measures

(3). Backyard poultry

- More than 90 % backyard poultry are collected from adjoined districts and supplied to the local markets of the district by suppliers and 10 % by farmers sell themselves
- Both backyard (Indian breed) and commercial broilers are imported without inspection and certification from southern borders

(4). Finished Commercial poultry transportation

- 100 % finished Commercial poultry are collected and transported by suppliers (traders)
- Finished Commercial poultry are moved to and fro in many districts during festival seasons and on demand
- Exit and incoming points are the same in each district
- En-route drop of live poultry are well practiced by suppliers before reaching to final destination(s).
- 100% spent hens go to the local markets of the target districts and sold as backyard poultry

(5). Poultry markets

- No organized poultry markets in the district (s), however, many local market points found in each district
- Collection and supply orders are set mostly by telephone or mobile contact

(6). Inspection, certification, preparedness plan and disease surveillance

- Border inspection and certification system is very weak
- Disease diagnostic facilities at the district level are poor
- Only passive surveillance system is functional
- No preparedness plan available for dreadful diseases of poultry, except that for HPAI. But have control program for ND and HPAI.

(7). Farm registration, recording and traceability system

- Farm registration is not mandatory to all commercial poultry farms
- Farm recording system is not applied in most of the cases
- Application of traceability system is almost zero at district level
- Black and white profit and loss date are missing at all levels
- Recording of movement of poultry, poultry products and feed and feed ingredients is not practiced

(8). Feed and feed ingredients

- 80- 90 % feed ingredients are imported from foreign countries without certification and checking by authorities. But exporting country sends some testimony specifying its basic qualities
- Ready-made feed move from one district to other district, where the chicks are supplied, without any restriction.

(9). Live vaccine movement

- Live vaccines are supplied both from Government and private sector
- 90 % live vaccines are supplied from the superstockiests of Kathmandu and Chitwan districts, while 10% is supplied from Government and private laboratories.
- Small farmers are not aware of cold chain and reasons of vaccine failure

(10). Application of legal provisions

- Very poor application of existing legal provisions by poultry farmers, traders, transporters and slaughtering places
- Weak implementation of existing acts, regulations and code of practice related to poultry production, transportation and marketing by the authorities.
- Standards and code of practice for poultry farm registration, production in place, but not updated
- No legal provision for traceability, back yard poultry production and marketing, commercial chicks/ poultry transportation and marketing

(11). High risk area / district

- Bordering areas, commodities crossing points/ districts, highway roadsides and big poultry farms or hatcheries located near by the backyard poultry

(12) Areas for amendment of existing/ formulation of new legal frameworks

- Application of good practices in poultry value chain
- Transportation of chicks, adult poultry, feeds, etc.
- Use of colour code in vehicles to transport feed, DOC, poultry and manure
- Informal importation and trading of unregistered vaccine, local poultry and chicks
- Local poultry management (production, collection, transportation, slaughtering and marketing)
- Separate code of veterinary practice for modern poultry slaughterhouse operation containing practical technical details on minimum standards of construction, processing procedures to ensure an acceptable standard of hygiene, inspection and sampling procedures and role of the government in the meat inspection service, etc.
- Mandatory farm identification, registration and traceability
- Specific infrastructure for the vehicle washing at some strategic points
- Motivation to police and AQ staff
- Mandatory record keeping by poultry farmers, traders and Veterinary staff
- Database keeping on poultry production, transportation/ movement and marketing at all levels
- Code of practice for the movement of veterinarians and technicians to visit farms
- Distribution of male and culled chicks or poultry
- Disposal of waste and dead bird in city areas
- Distribution / selling of quality chicks (quality commercial and local breed)
- Code of practice for poultry traders and suppliers
- Assurance for adequate supply of veterinarians and technicians at the field level
- Identify of poultry production and market zone
- Categorization of farms as per stock number to provide subsidy/facilities from the government side
- Monitoring and testing of quality of feed ingredients and prepared feeds by DLS
- Recording of feed movement (entry and exit at border, factory, en-route and districts)

12. Conclusion and recommendations

Poultry production is practiced in each and every district of Nepal, but the difference is in production practice. Still local/rural poultry contributes as much as 45 % of the total production of the country and vaccination of these poultry is rarely done against any infectious disease. In most of the cases, local poultry population is found in close proximity of big commercial farms or hatcheries.

Chitwan, Kathmandu and Kaski are considered as the principal hubs of poultry in Nepal. These districts supply DOCs and feeds to more than 60 districts of the country. Huge population of Kathmandu valley are the major consumers of poultry products; Pokhara and Chitwan fall in the second and third position respectively, although poultry and poultry products are consumed in almost all districts of the country.

During the study, it was found that farm production and supply recording system and biosecurity status were found very poor in every step of the poultry value chain. Very few farmers or traders have reliable records related to production and distribution. Even if they have one, they do not like to disclose it with external people. Reasons could be many, and this is why, it was very difficult to collect sufficient actual data even from Chitwan district. Smallholder farmers never keep records of production, sale and annual income.

Poultry value chain in Nepal seems to be very complex due to traditional practice, socio-economic status, physical feature of the district, long open cross -borders with neighbouring countries. Poultry and poultry products enter into the district from many points. Some of the major entry points were identified during this study.

Price factor is considered as the prime factor for free to- and fro movement of poultry, poultry products and feeds within the country and in the bordering areas. Besides, more than 1050 Km long Indo-Nepal open border has favored cross- border movement of poultry and poultry products. Recently, two Indian chilling vans/ trucks loaded with different poultry products hidden in the vegetable were seized by the police. This is just an example of illegal importation; nobody can say that how many trucks import such poultry products in the country illegally.

En-route drop of chicks, feed, eggs are well practiced by the suppliers, hatchery people and feed millers, but everything is set by telephone calls and with a list of receivers/ clients on a piece of paper. None of the traders of seven districts could produce an actual record of en-route drop of the commodity. They explained that en-route drop of consignment is a common practice in each district. All farmers have strong belief that farms located at bordering areas and transporters / suppliers of the districts might have played a great role in disease transmission; although other cross border activities cannot be ignored. However, evidence could not be established during the field visit, most of the farmers said that maximum number of hatcheries were infected with Salmonella infection and causing a great loss to the farmers. Such activities might have increased the risk of transmission of poultry diseases in various districts.

Poultry markets, as that found for livestock, are not organized in any districts under study, but marketing of local poultry are evident in each district at various places, either in form of *hat baazar* or selling at the public places. Besides, unvaccinated local poultry raised in rural areas and those informally imported from neighboring countries are moved from Jhapa to Kathmandu, Pokhara, Dang and other districts. Due to lack of proper surveillance of poultry

disease by the authorities, identification of source of infection is not easy, if outbreak occurs along the path or at any point of the district.

When the demand and price increases; poultry, DOCs, poultry products, feed and live vaccines move to- and fro in the different districts. Generally, it occurs during festival season (September to November months of the year), and manure moves during crop or vegetable season. Informal/illegal importation from open border, poor biosecurity measures at all levels of value chain, compromise in sanitation of vehicles, poultry farms at the bordering areas, malpractice of reuse of egg trays, cartoons, selling of local poultry in organized markets of the city can be considered as major risk factors to transmit poultry diseases. Movements of such commodities have challenged to all stakeholders for disease surveillance, early detection, diagnosis, prevention and control of the poultry diseases.

Lack of checking for health certificates, weak animal quarantine system, lack of proper surveillance, lack of recording system for feeds and feed ingredients have also greatly increased the risk of spread of diseases in the country.

Recommendations

Based on the above findings following recommendations are made for improvement in future:

i) Amendment of existing legal frameworks related to poultry production and marketing to ensure the effective field veterinary service; proper border control, inspection and certification services and implementation as per SPS agreements
ii) Prepare preparedness plan, surveillance plans for the most dreadful poultry diseases like ND, IB, IBD and salmonellosis, etc. and establish regular surveillance mechanism
iii) Strengthen veterinary laboratories at district and provincial levels for early detection and response of the poultry diseases;
iv) Application of farm registration, recording and traceability system throughout the poultry value chain:
v) Application of risk management and biosecurity measures at all levels;
vi) Establishment of organized scientific poultry markets (dry and wet) and poultry slaughterhouse as well as and poultry processing plants at strategic locations in public private partnership model;
vii) Ensure that rural poultry are vaccinated against New Castle Disease, Infectious Bronchitis, Fowl Pox and Infectious Bursal Disease;
viii) Control market price of the commodities to sustain the industry; and
ix) Conduct hands -on training to the key role players on risk management, biosecurity, record keeping, slaughterhouse management, market management and run awareness program targeting the consumers.
x) Establish clear line of command or coordination/collaboration mechanism among three tiers of government.
xi) Apply mitigation measures at identified critical control points to reduce the risk of disease transmission and economic loss due to movement of poultry and poultry products.

xii) Discourage registration of poultry farm to run at bordering lines. Better remove such farms from the border.
xiii) Activate the veterinary inspectors to inspect/ monitor the activities of farms, hatcheries and other stakeholders involved in the poultry value chain.
xiv) Issue Veterinary Health Certificate only by the authorized person.

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14. Annexes

Annex- 1: Population of chicken reported by commercial farms

Types of chicken	Unit	2014/15	2015/16	2016/17
Broiler parent	Thousand No	1152.5	1058.72	1553.6
Layer parent	Thousand No	105.2	76	102.9
Commercial broiler	Thousand No	72263.12	61423.6	85452
Commercial layers	Thousand No	9205.29	7824.5	8238.4
Total		82726.11	70382.82	95244
Chicken meat production	Thou. MT	121.313	107.9	150

Source: *Historical background of commercial poultry production, present status and way forward. Dr Til Chandra Bhattarai. Souvenir, Nepal Poultry and Livestock International Expo-2017, 3-5 th Nov 2017.*

Annex – 2: HPAI outbreak and total destruction of poultry

S.N.	Year	Number of outbreaks	Poultry destroyed	HPAIV clades in Nepal
1	2009	2	27560	2.2
2	2010	8	16600	2.2 and 2.3.2.1
3	2011	1	308	2.3.2.1 and 2.3.2.1 a
4	2012	12	11902	2.3.2.1 a
5	2013	204	1891879	2.3.2.1 a
6	2014	1	1430	2.3.2.1 a
7	2017	3	4009	2.3.2.1 a
8	2018	6	22144	
9	2019	12	116324	
	Grand total	**249**	**2092156**	

Source: a. www.oie.int/ animal health/overview/HPAI, 2019
b. www.dls.gov.np, 2018 and 2019.

Annex - 2a: Outbreak of major poultry diseases

S.N.	Disease	Outbreak No. 2012	Affected	Dead	Outbreak No. 2013	Affected	Dead
1	ND	313	127386	4804	132	104412	8139
2	HPAI	18	40731	40731	204	175504	175504
3	Fowl cholera	73	68194	309	20	6203	89
4	Fowl Pox	786	68077	511	429	32359	518
5	IBD	753	360781	11509	381	255235	9149
6	MD	4	3710	11	0	0	0
7	Pullorum	424	230854	7089	159	9431	470
8	AIB	0	0	0	0	0	0

S.N.	Disease	Outbreak No. 2014	Affected	Dead	Outbreak No. 2015	Affected	Dead
1	ND	92	87868	29142	128	76571	15832
2	HPAI	0	0	0	0	0	0
3	Fowl cholera	13	1610	135	47	25108	3570
4	Fowl Pox	104	12493	1055	143	12642	1045
5	IBD	134	209964	12768	171	188647	18679
6	MD	9	6455	93	4	1690	0
7	Pullorum	21	7382	1004	50	19095	3322
8	AIB	25	22756	1854	29	15849	2636

S.N.	Disease	Outbreak No. in 2016	Affected	Dead
1	ND	23	14455	824
2	HPAI	0	0	0
3	Fowl cholera	3	200	0
4	Fowl Pox	173	14139	687
5	IBD	134	171613	5653
6	MD	2	1684	0
7	Pullorum	16	10256	413
8	AIB	14	3949	228

Source: *Annual Bulletien of Veterinary Epidemiology Center, Kathmandu (2012 - 2016)*

Annex – 3: Production status in the target districts

Bhaktapur

Category	Unit	2013/14	2014/15	2015/16	2016/17
Chickens	Thou. Number	98.97	103.4	2143.9	2143.9
Ducks	Thou. Number	5.92	5.91	5.92	5.92
	Total	104.89	109.31	2149.82	2149.82
Laying chicken	Thou. Number	40.24	45.23	386	380.08
Laying ducks	Thou. Number	3.94	1.55	2.72	2.72

Lalitpur

Category	Unit	2013/14	2014/15	2015/16	2016/17
Chickens	Thou. Number	1772.87	1852.1	1485.5	530
Ducks	Thou. Number	3.69	3.7	3.6	0.2
	Total	1776.56	1855.8	1489.1	530.2
Laying chicken	Thou. Number	220.23	225.22	267.4	95.41
Laying ducks	Thou. Number	3.18	3.94	1.7	0. 87
	Total	1999.97	2084.96	1758.2	712.61

Kathmandu

Category	Unit	2013/14	2014/15	2015/16	2016/17
Chickens	Thou. Number	1520.52	1588.5	1859.3	583.6
Ducks	Thou. Number	3.58	3.58	4.75	4.75
	Total	1524.1	1592.08	1864.05	588.35
Laying chicken	Thou. Number	294.1	300.1	514.6	305.05
Laying ducks	Thou. Number	1.69	1.7	2.18	2.19

***Source**: Livestock Statistics of Nepal, DLS, 2015*
Livestock Statistics of Nepal, DLS, 2017
Annual Progress Report, DLS, 2017. Annex -1 and 2, p: 85

Chitwan

Category	Unit	2013/14	2014/15	2015/16	2016/17	2017/18
Chickens	Thou. Number	7126.7	7445.3		26884..7	
Ducks	Thou. Number	22.95	22.9		4.36	
Laying chicken	Thou. Number	1831.3	1831.3		4839.24	
Laying ducks	Thou. Number	9.07	9.07		2	

Kaski

Category	Unit	2013/14	2014/15	2015/16	2016/17	2017/18
Chickens	Thou. Number	1255.5	1311.6		26860.98	
Ducks	Thou. Number	7.92	7.92		11.89	
Laying chicken	Thou. Number	157.29	170.29		266.71	
Laying ducks	Thou. Number	1.99	2		5.23	

Jhapa

Category	Unit	2013/14	2014/15	2015/16	2016/17	2017/18
Chickens	Thou. Number	1290.84	1348.5		1510.49	
Ducks	Thou. Number	12.47	12.47		3.6	
Laying chicken	Thou. Number	224.2	226.2		260.19	
Laying ducks	Thou. Number	5.76	5.76		3.02	

Sunasari

Category	Unit	2013/14	2014/15	2015/16	2016/17	2017/18
Chickens	Thou. Number	1198.87	1252.5		1439.4	
Ducks	Thou. Number	43.31	43. 3		16.74	
Laying chicken	Thou. Number	156.36	156.36		276.3	
Laying ducks	Thou. Number	25.57	25.57		7.23	

Annex- 4: Poultry meat and egg production in the target districts

Bhaktapur

Category	Unit	2013/14	2014/15	2015/16	2016/17
Chickens meat	MT	106	106	647	852
Duck meat	MT	2	2	3	3
Total		108	108	650	855
Total eggs	Thousand	4913	4913	40995	40724

Lalitpur

Category	Unit	2013/14	2014/15	2015/16	2016/17
Chickens meat	MT	1678	1678	1953	2007
Duck meat	MT	2	2	2	1
Total		1680	1680	1955	2008
Total eggs	Thousand	14551	14551	32246	10025

Kathmandu

Category	Unit	2013/14	2014/15	2015/16	2016/17
Chickens meat	MT	2015	2015	2294	2301
Duck meat	MT	2	2	2	3
Total		2017	2017	2296	2304
Total eggs	Thousand	24937	24937	41233	11198

***Source**: Livestock Statistics of Nepal, DLS, 2015*
Livestock Statistics of Nepal, DLS, 2014
Livestock Statistics of Nepal, DLS, 2017

Chitwan

Category	Unit	2013/14	2014/15	2015/16	2016/17
Chickens meat	MT	5141	5141		9960
Duck meat	MT	16	16		13
Total eggs	Thousand	232762	232762		519375

Kaski

Category	Unit	2013/14	2014/15	2015/16	2016/17
Chickens meat	MT	1161	1161		1790
Duck meat	MT	12	12		19
Total eggs	Thousand	15951	15951		29259

Jhapa

Category	Unit	2013/14	2014/15	2015/16	2016/17
Chickens meat	MT	1126	1126		1604
Duck meat	MT	9	9		9
Total eggs	Thousand	23983	23983		28810

Sunsari

Category	Unit	2013/14	2014/15	2015/16	2016/17
Chickens meat	MT	1100	1116		936
Duck meat	MT	22	22		24
Total eggs	Thousand	17676	17676		35208

Annex- 5: Formal imports of chicks, eggs and other birds from TIA and southern borders

Fiscal Year	Parent Broiler chicks	Parent Layer chicks	Hatching eggs	DO Ducklings	Pigeon	Bird Jeri	Parrot
2016/17	1943426	106946	319880	0	0	522	261
2015/16	971790	92880	43920	498	271	716	356
2014/15	1183900	98332	36400	0	0	407	45
2013/14	1464718	138378	82080	0	32	1461	257
2012/13	871569	95326	130480	0	90	2699	84

Source:
Annual Progress Report, DLS, 2017, p: 66- 72
Annual Technical Report, VSDRL 2016/17
Livestock Statistics of Nepal, 2017. DLS Harihar bhawan.

Annex – 6: Informal imports: Total poultry and poultry products destroyed by border CP

Commodity	**Unit**	**2014/15**	**2015/16**	**2016/17**
Chicks	No	535195	143257	230731
Broiler chickens	No	6539	29718	10750
Eggs	No	1050	6283	17160
Total		542784	179258	258641
Poultry meat	Kg	1893	1224	950

Source: Annual Technical Report 2016/2017. Central AQ Office, Budhanilakantha

Informal trade at Kankadvitta: Poultry and poultry products destroyed by border CP

Commodity	Unit	2014/15	2015/16	2016/17
Chicks	No	7787	NA	NA
Broiler chickens	No	307	NA	NA

Source: Annual Technical Report 2014/15- 2016/2017. Central AQ Office, Budhanilakantha

Annex- 7: List of big hatcheries

Lalitpur

S.N.	**Name**	**Proprietor**	**Contact No.**
1	Desar Poultry Industries, Godavari	Ganesh Lal Desar	9851000975
2	Lalitpur Harchery, Godavary	Rosan Timilsina	9851042182
3	Champapuri Hatchery and Breeding Farm	Nil B Shashi	5571369
4	Kantipur Hatchery, Satdobato		

Bhaktapur

S.N.	Name	Proprietor	Contact No.
1	Aashapuri Hatchery, Jagati	Narayan Khatri	
2	Bhadgaun hatchery and Feed Industry, sallaghari	Hari P. Shrestha	
3	G J. Hatchery, Jagati	Bala Ram Kisi	9851042882
4	Subal hatchery, Katunje		
5	Himal Poultry Breeding Hatchery	Pravat Pasakhala	
6	Siddhi Ganesh Hatchery, Gamchha	Madav basnet	9851052952
7	Khartri Puoltry Breeding Farm, Changunarayan -9	Puskar Khatri	
8	Aaditya Poultry Farm, Thimi		
9	Surya Poultry, Bhaktapur		
10	Subal Puoltry Breeding Farm	Hari P Suwal	
11	Sagar Poultry Breeding Farm, Duwakot	Endis Suwal	
12	Changunarayan Poultry and Hatchery uddyog, Changunarayan -8	Deepak Giri	
13	Saugat Poultry Breeding Farm, Changunarayan - 9	Sudip Ku. Khatri	
14	Nabajyoti Poultry Breeding Farm, Dadhikot	Hari B. Basnet	

Kathmandu

S.N.	Name	Proprietor	Contact No.
1	Phunyal Poultry and Feed Industry, Balaju	Narayan P. Phunyal	
2	The rising hatchery, Tarakeshwor -13	Anuj B.C.	
3	Valley Poultry Pvt. Ltd , Kathmandu -16	Dr Karna B. Bohara	
4	Januka Poultry Farm, Jitpur	Ram P Pudasaini	
5	Annapurna Hatchery, Sundarijal	Arjun Man Sangat	
6	Manandhar Exist Pvt. Ltd, Balaju	Laxmi Das Manandhar	
7	Budhanilkantha Hatchery, Budhanilkantha	Manohar Karki	9851074597
8	Nilkantha Hatchery, Budhanilkantha	Binod Chandra K.C.	
9	Quality Hatchery, Kathmandu -16		
10	Aadhunik Poultry Breeding Farm, Balaju		
11	Bagmati Poultry Farm, Manamaiju		
12	Great Himalayan Poultry Farm, Chhauni		
13	Hatch Nepal Pvt. Ltd, manamaiju		
14	Prakash Breeding Farm, Thankot		
15	S.S. Poultry Breeding Farm, Bauddha, mahankal		
16	Shankharapur Hatchery, Sankhu		
17	Manju Feed and Poultry Industry, Ramkot		
18	Sitapaila Hatchery, Sitapaila		
19	Anil Poultry Hatchery, Futung		
20	Dharmasthali Hatchery Uddyog, Dharmasthali		

Chitwan

S.N.	Name of big hatcheries	Proprietor	Contact No.
1	Ganga Poultry Farm		
2	Baba Poultry and Breeding Farm		
3	Aryal Hatchery		
4	Om Sai Poultry Udyog		
5	Sahara Cobb Breeding Pvt. Ltd		
6	Biju Poultry Farm Pvt. Ltd		
7	Himalayan Cobb Breeding Farm		
8	Ekta Nepal Breeding Pvt. Ltd		
9	KDA Feed and Poultry Pvt. Ltd.		
10	Prarthana Hatchery Pvt. Ltd.		

Note: More than 90 small hatcheries are located at different places

Kaski

S.N.	Name of hatcheries	Proprietor	Contact No.
1	Ruchi hatchery		

Jhapa

S.N.	Name of hatcheries	Proprietor	Contact No.
1	Kankai hatchery		
2	Bhatbhateni hatchery		
3	Hatchery for back yard poultry chicks		
4	Quail hatchery		

Sunsari

S.N.	Name of hatcheries	Proprietor	Contact No.
1	Satya Sai hatchery		
2	Saptakoshi hatchery		
3	Itahari hatchery		
4	Purbanchal hatchery		
5	B and B hatchery		

Note: 3 very small haycheries are also running in this district

Annex – 8: Feed Industries

Feed industry at Kathmandu

S.N.	Name	Address	Contact
1	Aadhunik Poultry Feed Products	Balaju	4351862
2	Amrit Feed Industries	Swayambhu	4283225
3	New Bageswori Feed Industries	Kapan	4810826
4	Binayak Feed Industries	Gokarna	4465787
5	Budhanilkantha Dana Uddyog	Hattigauda	5376248
6	Bhinsen Feed Industries	Balambu	2200018
7	Dhunibesi Feed Industries	Thankot	4312777
8	Phunyal Poultry Feed Pvt. Ltd	Manamaiju	5382973
9	Kathmandu Poultry Feed Company	Balaju	4355825
10	Nepal Feed Product Pvt. Ltd	Balaju Industrial Estate	4350769
11	Pancha Kanya Feed Industries Pvt.Ltd	Ramkot, Kantipur Basti	4272156
12	Quality Feed Industries	Balaju	4350961
13	Ratna Feed Industries	Balaju	4350134
14	R. R. Feed Products	Jorpati	4471198
15	Rajib Feeds	Kalimati	4270381
16	S S Poultry Breeding and Feeds	Indrayani	4451354
17	Sitala Feed Industries	Balaju	4351187
18	Star Feed Products Pvt. Ltd.	Balaju	4350291
19	Triman Feed Industries	Swayambhu	4278921
20	Valley Feed Industries	Balaju	4351381
21	Ggautam Feed Industries	Tin Thana	4312709
22	Shyam Feed Industries	Balaju	4478405
23	Sagarmatha Poultry Feed Products	Gongabun	4355160
24	Top Quality Poultry Feed	Gongabun	4383215

Feed industry at Lalitpur

S.N.	Name	Address	Contact
1	Kisan Dana Uddyog	Patan Industrial Estate	5522117
2	Chandanpur Dana Uddyog	Chapagaun-4	5571369
3	Lalitpur Dana Uddyog	Chapagaun-4	

Feed industry at Bhaktapur

S.N.	Name	Address	Contact
1	Aam Dana Uddyog	Lokanthali	
2	Udaya Feed	Thimi	
3	Aadarsha Feed	Thimi	
4	Udaya Quality Feed	Jagati	
5	Kantipur Feed	Bhaktapur Industrial Estate	
6	New Kantipur Feed	Bhaktapur Industrial Estate	
7	Bishnumati Feed	Balakumari	
8	Sakar Quality Feed	Decocha	
9	Khop Feed Pvt. Ltd.	Bhaktapur -18	
10	Khop Dana Uddyog	Bhaktapur	
11	Neupane Poultry Feed	Dadhikot	
12	Rohini Dana Uddyog	Bhaktapur	
13	Devi Feed	Chittapol	

Feed industry at Chitwan

1. Pellet feed mills = 12
2. Mash feed mills = 12

Total = 24

Feed industry at Kaski

Only Small Feed mills running for local and Giriraja, Kroiler birds. No feed mills for commercial chickens.

Feed industry at Jhapa

1. Star Feed Industry
2. Bhadrapur Feeds
3. Valley Feeds

Feed industry at Sunsari

1. Sagar Feeds
2. Purbanchal Feeds
3. Sun Feeds
4. Koshi Feeds
5. Chandani Feeds

Under construction: Upakar Feeds, Bright Feeds

Annex – 9: Summary of the major problems and suggestions obtained from stakeholders

Problems pointed by Government officials/ Key informants/ Security personnel

Infrastructure related

- No specific infrastructure for the vehicle washing at some strategic points
- No medium scale slaughterhouse for poultry and chilling van for meat marketing
- Inadequate facilities at AQCPs for proper inspection and certification
- Present structure of Vet Hospital, Laboratory and Animal Quarantine is not practical. No chain of command by organizational structure and very difficult to maintain

Legal frameworks, inspection and certification related

- Loose enforcement of laws and weak quarantine system and poor-quality inspection and certification of consignments at the checking points by qualified veterinarians as well as illegal vet health certificate issues
- Local body provides permission/ registration to many poultry farms without taking technical advice from to Veterinary staff/ Veterinary Hospital
- Lack of frequent monitoring and inspection of the activities of poultry farmers, transporters and other inputs suppliers
- No rules for transportation of chicks, feeds, disposal of dead chickens/ chicks
- No use of color code in vehicles to transport feed, DOC, poultry and manure
- Illegal importation and trading of unregistered vaccine and chicks
- No policy for mass raw material production in the country
- No rules for local poultry marketing
- No system of monitoring of quality of feed ingredients and prepared feeds
- Present structure of Vet Hospital, Laboratory and Animal Quarantine is not practical. No chain of command by organizational structure and very difficult to maintain
- Lack of provision of mandatory farm registration
- No provision of motivation to police and AQ staff, and provision of low penalty to culprit
- No enforcement of slaughterhouse and meat inspection act, 2055 and its regulation
- Local poultry is imported from India during night by the poultry farms near by the bordering line
- Difficulty to dispose dead birds by security force due to lack of clear-cut policy

Biosecurity, sanitation and hygiene

- Biosecurity only 25-50 % satisfactory in commercial farms; 75 % satisfactory in big hatcheries and less than 25% in small hatcheries; Only 50 % satisfactory in big slaughter places and 25 % satisfactory in small slaughtering

- Sanitation of vehicle is not maintained by the suppliers (Feed, eggs, chicks, drugs, etc. are supplied from a single point (supplier) and same vehicle which may play a great role in the spread of the poultry diseases). Vehicles are not properly disinfected by transporters/ supplier or suppliers
- Very poor biosecurity at small farms and slaughtering places.
- No biosecurity measures applied in backyard
- Selling of dead poultry by farmers and hatcheries to hotel, restaurants, pig and fish farms. Farmers not aware about drawbacks of feeding of dead poultry to fish and pigs
- Some farmers practice slaughtering and dressing of the sick birds before they die
- Hatchery and layer farms reuse old creates, cartoon, egg- trays
- No proper orientation to farmers to create awareness on biosecurity, sanitation and hygiene.

Disease surveillance and disease control

- No active surveillance done in the field except during outbreak of HPAI.Only passive surveillance done due to unclear reporting system. Chain of surveillance activities are broken in new structure
- Vaccine failure in the field
- No vaccination practice in local poultry
- No database on poultry production, transportation and marketing
- Inadequate level of awareness in farmers, transporters and traders on disease prevention and control
- Delay communication and actions when there are serious problem or disease outbreaks
- Inadequate coordination at different levels. Problems of grass-root level are not responded by federal /higher level

Record keeping

- No record keeping by farmers, traders and Veterinary staff
- Recording of feed entry and exit has been stopped
- Most of the feed ingredients are imported from foreign countries but its movement is not recorded, except in customs.
- Price difference in Indo-Nepal border is the principal cause of movement of poultry and poultry products, but the volume of export or import is not recorded.

Others

- Undue political pressure to release the culprit, if taken into custody by the police
- Culture and belief of person to eat white eggs and local poultry
- No needy antibiotics and vet drugs registered in Department of Drug Administration. Drugs without MRP are freely sold in the market.

Trader's problems

Infrastructure related

- Lack of big cold store in the district cause delayed marketing of broiler poultry
- Unmanaged poultry markets
- Higher number hatcheries than required

Legal frameworks, inspection and certification related

- No practical and realistic policies, rules and regulations to support poultry producers, traders and transporters; some policies are not clear
- Poultry farm regulations not properly enforced
- Illegal hatchery operation by small hatcheries holders
- Poor monitoring and inspection of farm, hatchery, feed mills and transport activities by competent authority
- Use of illegally imported vaccine in parent against bird flu by parent stockiest
- Delay in giving import permission by DLS
- Illegal Import of poultry, meat, eggs at bordering areas (Chicks, eggs, vaccines come from India during shortage. Sometimes some volume of chickens and eggs come from Galgalia (India) also. Most illegal /informal imports are from the western parts of Jhapa district).
- Supply of sub- standard vaccine, chicks and ready-made feeds.
- Complicated industry registration process

Biosecurity, sanitation and hygiene

- Selling of dead poultry to fish and pig farms by farmers and hatchery personnel
- Biosecurity at farms is only 25 to 50 % satisfactory at farms
- Consumer's awareness on proper age and weight of broiler chickens is lacking

Disease surveillance and disease control

- Only passive surveillance is done
- Misuse of health certificate
- Chain of surveillance activities are broken in new structure
- 5-10 Chickens distributed by INGO/ NGO to farmers are not regularly vaccinated

Record keeping

- No proper record keeping on movement of commodities by stakeholders.

Others

- High price of raw materials (feed, feed ingredients, chicks, vaccines);
- Inadequate raw materials for feed production within the country
- Haphazard use of medicine

Farmer's problems

Infrastructure related

- Loose system of license providing to the poultry farmers - leading to transmit of disease
- Loose veterinary checking at check points
- Unorganized and unscientific local poultry market.

Policy, Legal frameworks, inspection and certification related

- No reliable laboratory for quick diagnosis of poultry diseases. Delay in diagnosis of diseases by lab that lead to spread of disease in other districts also
- Farmers do not know about COP, prevailing government rules
- Many dangerous entry points along the bordering areas and adjoining districts. Illegal import of poultry and eggs spreading diseases
- Importation of sub -standard medicine and vaccine causing treatment and vaccine failure
- No insurance of broilers by Companies. Insurance policy and practice differs for poultry. It is tedious
- No soft loan and subsidy accessible to small holding poultry farmers
- No category of the farmers as (i) holding less than 5000 chickens (ii) holding above 5000 chickens to provide subsidy or other government facilities to small farmers.
- No provision of price control by the government. No scientific pricing system of poultry and poultry products
- No fixed area identified by the authority for poultry production

Biosecurity, sanitation and hygiene

- Disease transmission by supplier's vehicles (Feed, chicks and vaccines are transported at a time by vehicles and may be the major source of infection or outbreak of different types of poultry diseases). No proper washing of vehicles by transporters. Vehicles are not sterilized immediately after delivery of the consignment. This might have played a great role in disease transmission
- Visit at 3-4 farms/ day by technicians taking very less biosecurity measures.
- Illegal chick distribution by certain group of people
- Local poultry are carrier of fowl pox, ND, IBD and CRD in valleys
- Problem of disposal of dead bird in city areas
- No training on biosecurity and dead poultry management to farmers. Very less farmers and butchers are aware on biosecurity and risk of disease transmission due to reuse of cartoons, crates and egg-trays, and dirty slaughtering places. Some hatcheries use old creates, cartoon and farmers reuse the old egg- trays
- Hatchery generally provides chicks of very low quality or local breed in which hatching % is less than 2%. (Standardize the hatcheries to produce reliable and standard chicks)

Disease surveillance and disease control

- **Frequent outbreak of** Salmonella, E. Coli, IBD, CRD ,H9, H5 and Mycotoxins borne diseases
- *Salmonella* in hatchery which might be transmitting the diseases. High production loss due to diseases
- No vaccination practice in local poultry
- Chain of surveillance activities are broken in new structure. Only passive surveillance is conducted in the field
- Cold chain not maintained / No inverter in vaccine supplier- leading to vaccine failure

Record keeping

No proper record keeping in the farms

Others

- Role played by middleman in buying and supply
- Marketing of unregistered medicine and vaccine. Shortage of quality drugs in the market in genuine price
- Inadequate number of technicians in the field and unhygienic practice of technicians
- Price of poultry, DOC, eggs, feed, and transport cost, market rate monopolized by a group of people; no genuine price obtained by the producers.
- High production cost due to high cost of input materials due to higher customs duty
- Misuse of subsidy in other activities like plotting and real-state business by so called farmers

Suggestions obtained from stakeholders

Infrastructure related

- Strengthen Avian laboratory for early and reliable diagnosis of poultry diseases
- Establish basic laboratories at district level for quick diagnosis and response
- Establish organized poultry markets at different locations
- Establishment of large poultry slaughterhouse from government side in PPP modality at strategic points
- Market management of local poultry by the government side and supports from private sector

Policy, Legal frameworks, inspection and certification related

- Discourage registration of poultry farm to run farms at bordering line
- Strict implementation of existing laws; provision of heavy penalty to the culprit
- Joint patrolling provision (Vet/technicians, police, representatives from poultry commodity association)

- Formulation and implementation of transportation rules for each commodity (one commodity by one vehicle- identification by color too)
- Mandatory vaccination in local poultry against infectious/ contagious diseases
- Strong monitoring and supervision of farm, hatchery, suppliers by the authority
- Application of effective monitoring, inspection and certification system at AQCP
- Security agencies should be sensitized for inspection and controlling
- Identify of poultry production zone
- Revive the feed recording system as previously done by check points
- Increased role of local government in surveillance, prevention and control of poultry diseases
- Establish linkage with Vet. labs, animal quarantine and veterinary hospital and strength them with necessary facilities
- Motivation to youth of bordering area to control informal importation
- Provision of single gate system in one Rural Municipality located at border, wherever possible
- Selling of local poultry along the roadside must be discouraged
- Effective insurance support to broiler raising farmers
- Control importation by proper inspection and certification
- Build inter-governmental coordination mechanism to simplify the process and sincerity in work procedure
- Rational import permission. Provision of blacklisting to those who supply substandard drugs vaccines even after getting warning from the authority.
- Provide permission to establish new poultry farms only when it meets established standards
- Formulate and execute disease control program/ early preparedness
- Either stop distributing 5-10 rural poultry to the farmers or ensure vaccination of those chickens routinely
- Strict inspection and certification at police check points /Animal Quarantine Check posts.
- Cooperate to authority for inspection and certification by the hatcheries and farmers
- Strict quality testing of feeds and feed ingredients

Biosecurity, sanitation and hygiene

- Create awareness to decrease/ control local poultry production through Thakali (community leader) and announce message in festivals /*Mela*
- Consider proper biosecurity measures at all levels
- Discussion with hatchery people, technicians, vaccine /drug suppliers on efficacy of vaccines and drugs
- Different vehicles for different commodity transportation and proper cleaning and disinfection in every trip
- Awareness to farmers and traders on the risk of reusing sacs, crates, egg-tray, etc.
- Adopt proper biosecurity measures by all poultry producers

- Training to the transporters on proper washing, cleaning and disinfection of vehicles.
- Training on biosecurity measure at farms, hatchery and slaughter places.
- Training on communicable diseases, TADS and biosecurity to all stakeholders of poultry value chain

Disease surveillance and disease control

- Re-establish surveillance mechanism
- Database on poultry production and marketing
- Quick diagnostic kit to the field technicians

Record keeping

- Commitment of fair trade and morality from traders
- Proper record keeping by all stakeholders on production, movement and marketing of commodity that they produce

Additional Suggestions from stakeholders

- Categorization of farms per stock number
- Provision of soft loan to farmers and traders for production and marketing
- Provision of soft loan for vehicle purchase.
- Provision of microfinance support
- Provide Subsidy or facilities to small holder farmers.
- Effective insurance support to broiler poultry farmers
- Fixing the rate of day- old- chicks by the government
- Reduce Customs duty on raw materials
- Formulate Policy and program to produce maize, soya, brans, etc. in the country
- Avail quality vet medicines in genuine price
- Apply rational pricing system for profitable poultry production and, marketing.

Problems and suggestions obtained from stakeholders (District-wise)

Lalitpur district

Key informants/ Security personnel's suggestions

- Develop an infrastructure for the vehicle washing at some strategic points
- Build medium scale slaughterhouse for poultry and make the meat by chilling van
- Create awareness on drawbacks of feeding of dead poultry to fish and pigs
- Use of color code in vehicles to transport feed, DOC, poultry and manure
- Check consignments strictly at the checking points by qualified veterinarians
- Monitor the activities of poultry farmers and inputs suppliers frequently
- Re-establish chain of surveillance activities
- Mandatory use of vaccine in local poultry

Trader's problems

- High price of feed, feed ingredients, chicks, vaccines;
- Supply of sub- standard quality of vaccine, chicks and feed;
- No reliable laboratory for quick diagnosis of poultry diseases;
- Delayed marketing of poultry due to lack of cold storage
- Selling of dead poultry to fish and pig farms by farmers and hatchery personnel
- Use of illegal use of vaccine in parent against bird flu by parent stockiest
- Consumer's awareness on proper age and weight of broiler chickens.
- Misuse of health certificate
- Illegal hatchery operation
- Poor monitoring and inspection, etc.

Farmer's problems

- Price of poultry, eggs, feed, transport cost, market rate monopolized by a group of people;
- Feed, chicks and vaccines are transported at a time by vehicles;
- No proper washing of vehicles by transporters. Vehicles are not sterilized immediately after delivery of the consignment. This might have played a great role in disease transmission
- Chain of surveillance activities are broken in new structure
- No training on biosecurity and dead poultry management to farmers
- No genuine price obtained by the farmers
- Visit at 3-4 farms/ day by technicians taking very less biosecurity measures.
- Illegal chick distribution,
- No vaccination practice in local poultry
- No insurance of broilers by Companies
- Illegal poultry import spreading diseases
- Most dangerous entry points such as Bhattedanda, Lankuri Bhanjyang, Chovar, Jadibuti, Balakumari and Kupandol are to be monitored

<u>Bhaktapur district</u>

Key informants/ Security personnel's suggestions

Problems:

- High price of feed, feed ingredients, drugs
- Inadequate raw materials for feed production within the country
- Poor monitoring and inspection of farms, industry and during transportation
- Selling of dead poultry by farmers and hatcheries
- Chain of surveillance activities are broken in new structure
- No provision of the soft loan for the procurement of vehicle and establishing farms
- Vaccine failure in the field
- No vaccination practice in local poultry
- Unorganized and unscientific local poultry market. Local poultry are carrier of fowl pox, ND, IBD and CRD

Suggested way-out:

- Joint patrolling provision (Vet/technicians, police, representatives from poultry commodity association)
- Create awareness to decrease/ control local poultry production through Thakali (community leader) and announce message in festivals /*Mela*.
- Discussion with hatchery people, technicians, vaccine /drug suppliers on efficacy of vaccines and drugs
- Re-establish surveillance mechanism
- Consider proper biosecurity measures at all levels
- Commitment of fair trade and morality from traders
- Strict implementation of the laws; provision of high penalty to the culprit
- Different vehicles for different item transportation and proper cleaning and disinfection in every trip.
- Nomadic selling of local poultry must be discouraged

Trader's problems

- Poor monitoring and inspection
- High price of raw materials
- Inadequate raw materials in the country
- Unclear related policies

Farmer's problems

- Problem of disposal of dead bird.
- No insurance support to broiler producers
- No soft loan and subsidy accessible to small holding poultry farmers
- No category of the farmers as (i) holding less than 5000 chickens (ii) holding above 5000 chickens to provide subsidy or other government facilities.

<u>Kathmandu district</u>

Key informants/ Security personnel's problems and suggestions

Problems:

- High price of feed, feed ingredients, drugs
- Illegal importation and trading of unregistered vaccine and chicks
- Poor monitoring of farm activities by authorities
- Weak quarantine system: Illegal vet health certificate. Poor quality inspection and certification.
- Chain of surveillance activities are broken in new structure
- No policy for raw material production in the country
- No support from the media
- No proper disinfection of trucks, pick-up
- Selling of dead birds to hotel, restaurants, pig and fish farms by hatcheries and farmers.
- No rules for transportation of chicks, feeds, disposal of dead chickens/ chicks
- Farmers do not know about COP, prevailing government rules
- Transportation of feed, chicks, and adult birds by the same vehicle at a time may be the major source of infection or outbreak of different types of poultry diseases.

- No provision for soft loan for production and loan for vehicle.
- Problem of disposal of / or selling of dead birds
- Hatchery and layer farms reuse old creates, cartoon, egg- trays.
- No separate rules for different classes of farmers (less than 5000& above 5000).
- Provide subsidy to small farmers.
- Insurance support to broiler keepers
- No rules for local poultry marketing
- Vaccine failure
- No Database on poultry production and marketing

Suggested solutions:

- Categorization of farms per stock number
- Soft loan to farmers and traders for production and marketing
- Subsidy or facilities to small farmers.
- Re-establish surveillance mechanism
- Effective insurance support to poultry farmers
- Quick diagnostic kit to technicians
- Awareness to farmers and traders on the risk of reusing sacs, crates, egg-tray, etc.
- Fix the rate of day-old chicks by the government
- Effective monitoring, inspection and certification system
- Database on poultry production and marketing

Trader's problems

- Marketing of unregistered medicine and vaccine
- No practical and realistic policies, rules and regulations to support poultry producers and traders
- Inadequate number of technicians in the field and unhygienic practice of technicians
- Delay in diagnosis of diseases by lab that lead to spread of disease in other districts also
- High price of feed and other raw materials

Farmer's problems and possible solutions

Problems

- No provision of soft loan and loan for vehicle purchase.
- Hatchery use old creates, cartoon and farmers reuse the old egg- trays
- Cost of poultry production very high,
- No separate rules for different classes of farmers (less than 5000& above 5000). Provide subsidy to small farmers.
- No insurance support to broiler keepers
- Problem of disposal of dead birds in urban areas.
- Delay in diagnosis of diseases
- All farmers not aware on the risk of disease transmission due to reuse of cartoons, crates and egg-trays, etc.

Solution:

- Provision of microfinance support

- Categories farmers as a. Less than 5000 and b. Above 5000. Otherwise small farmers cannot sustain.
- Provision of soft loan to farmers and traders
- Soft loan for vehicle purchase.
- Make subsidy accessible to small holder farmers.
- Effective insurance support to poultry farmers
- Quick diagnostic kit to technicians
- Awareness on the risk of using sacs, crates, etc.
- Fix the rate of day -old- chicks
- Effective Monitoring of farms and market activities.

Chitwan district

Key informants/ Security personnel's suggestions

Problems:

- Loose enforcement of laws
- Chain of surveillance activities are broken in new structure
- No system of monitoring of quality of feed ingredients and prepared feeds
- Inadequate facilities at AQCPs for proper inspection and certification
- Vet Hospital and lab. services are weak and unreliable
- No vaccination practice in local poultry
- Lack of awareness in farmers and traders on disease control
- Present structure of Vet Hospital, Laboratory and Animal Quarantine is not practical.
- No chain of command by organizational structure and very difficult to maintain
- Inadequate communication and actions when there are serious problem or disease outbreaks.
- Some farmers have practice to slaughtering and dressing of the sick birds before they die.
- No proper labeling in feed-sac. No mfd, expiry date and maximum retail price

Suggestions:

- Proper enforcement of acts and regulations
- Re-establishment of surveillance mechanism
- Security agencies should be sensitized for inspection and controlling
- New Organization and linkage is necessary to strengthen labs, animal quarantine and veterinary hospital.
- Make mandatory provision of proper labeling in feed-sac with manufacturing date , expiry date and maximum retail price

Trader's Problems and solutions

- No slaughterhouse
- Illegal Import of meat, eggs and
- High price of raw materials
- Delay in giving import recommendation by DLS
- Poultry farm regulation not properly enforced
- Importation of sub -standard medicine and Vaccine

- Higher number hatcheries than required

Suggestions

- Establishment of large poultry slaughterhouse from government side in PPP modality
- Controlled import by proper inspection and certification.
- : Customs duty should be reduced, and raw materials should be produced in the country
- Apply inter-governmental coordination to simplify the process and sincerity in work procedure.
- Enforce existing rules strictly
- Provide permission to establish new poultry farms only when it meets established standards.
- Rational import permission. Provision of blacklisting to those who supply substandard drugs/ vaccines even after getting warning from the authority.

Farmers' problems

- **Frequent outbreak of** Salmonella, E. Coli, IBD, CRD ,H9, H5 and Mycotoxins diseases
- *Salmonella* in hatchery and they are transmitting the diseases
- Inefficient marketing of poultry (Imbalanced demand and supply)
- No provision of price control by the government
- No scientific pricing system of poultry and poultry products
- High production cost due to high cost of input materials due to higher customs duty
- Misuse of subsidy in other activities like plotting and real-state business by so called farmers
- Shortage of required drugs but higher price
- Sub- standard drugs in the market
- No vaccination practice in local poultry

Proposed solutions

- Strengthen Avian laboratory for early and reliable diagnosis of poultry diseases
- Formulate and execute disease control program
- Avail quality medicines in genuine price
- Rational pricing system
- Subsidized loan to farmers to procure raw material and other inputs
- Strict inspection and monitoring of hatcheries by the government mechanism
- Adopt proper biosecurity measures by all poultry producers
- Cooperate to authority for inspection and certification by the hatcheries and farmers

<u>Kaski district</u>

Problems identified by key informants/ Security personnel's

- No separate rules for using one type of vehicle for single commodity transportation
- Vehicle used not cleaned daily
- Very poor biosecurity at small farms and slaughtering places
- Rules and regulations not enforced properly
- Chain of surveillance activities are broken in new structure
- No proper Training to farmers on Poultry Management and biosecurity.
- Lack of mandatory farm registration

- Monopolized price of produces by suppliers
- Inadequate monitoring and supervision
- Inadequate inspection and certification.
- Selling of dead poultry for human consumption at very low price

Traders Problems and solutions

- Unmanaged market
- Sales on credit
- Haphazard use of medicine
- Weak monitoring and supervision of farms, hatchery and transporter from authorities
- Distribution of 5-10 chickens by INGO/ NGO (e.g. Suaahara distributing chickens without vaccination provisions)
- Acts, regulation, COP are not enforced properly
- Weak disease diagnosis facilities in laboratory to diagnose all poultry diseases
- High bank interest rate
- Very high price of feed ingredients
- Loose system of License providing to the poultry farmers - leading to transmit of disease
- Loose veterinary checking at check points.

Possible solutions:

- Ensure the proper implementation of prevailing act, rules and COP
- Should be organized market
- Identification of poultry production zone
- Either stop distributing 5-10 rural poultry to the farmers or ensure vaccination of those chickens routinely
- Strong monitoring and supervision of farm, hatchery, suppliers by the authority
- Rules of transportation of one commodity by one vehicle.
- Training to the transporters on proper washing, cleaning and disinfection of vehicles.
- Training on biosecurity measure at farms, hatchery and slaughter places.
- Strengthen the Veterinary lab of Pokhara and establish basic laboratory to diagnose the poultry disease at districts
- Strict inspection and certification at police check points /Animal Quarantine Check posts.

Farmers' problems

- Transportation of feed, chickens, chicks, eggs by the same vehicle
- No proper washing of vehicle after delivery of commodity
- Subsidized loan not easily available to the traders and farmers
- Small holder or backyard poultry near by the big farm acting as a source of disease transmission
- Disease transmission by supplier’s vehicles
- Very less farmers and butchers know about biosecurity at farms and slaughtering places
- Farm registration is not mandatory to all poultry farmers
- No fixed area for poultry production
- Supply of low-quality feed or no provision of checking of feed quality
- Monopolized feed rate
- No quick lab. diagnosis facilities in the district

- Haphazard crossing of local chickens with giriraja/ Kroiler

Possible solutions

- Formulation and implementation of transportation rules for each commodity
- Provision of soft loan to farmers and traders
- Identification of poultry production zone
- Training on biosecurity to all stakeholders of poultry value chain
- Strict quality testing of feeds and feed ingredients
- Fix the rate of commodities by the government
- Strengthen Veterinary laboratory
- Establish basic laboratories at district level for quick diagnosis and respond

Jhapa district

Key informants/ Security personnel's suggestions/ experiences

Problems:

- Lab diagnosis not done in Jhapa
- Opening days of Offices of the same province differs
- Lack of coordination among the Govt. Officials
- Recording of feed entry and exit is stopped
- Most of the feed ingredients are imported from foreign countries
- Local poultry is imported from India during night (1AM - 4 AM)
- Poultry farms near by the bordering line
- Price difference in Indo-Nepal border (Movement of poultry and poultry products is due to price difference)
- No monitoring of farms, hatcheries, transporter, feed industry, etc.
- Undue political pressure to release the culprit
- No provision of motivation to police and AQ staff
- Culture and belief of person to eat white eggs
- Difficulty to dispose dead birds by security force
- Problem in regular surveillance due to unclear provision
- Provision of low penalty to culprit
- No vaccination practice in local poultry
- No proper orientation to farmers to create awareness
- No enforcement of slaughterhouse and meat inspection act

Trader's Problems and solutions

- Increased informal importation of poultry and poultry products
- Stopping of recording of feed transported by security personnel
- Chicks, eggs, vaccines come from India during shortage. Sometimes some volume of chickens and eggs come from Galgalia (India) also
- Most illegal /informal imports are from the western parts of Jhapa district.

Suggestions

- Increase patrolling in suspected areas and control informal importation
- Joint monitoring system at bordering areas

- Market management by the government side and supports from private sector
- Revive the feed recording system as previously done
- Role of local government should be increased
- Training to the farmers on biosecurity, communicable diseases and TADS
- Market value of the poultry and poultry products should be reasonable so that farmers can be stable.

Farmers' problems

1. Lack of market management
2. Pricing (chicks, egg, feed, dressed meat)/ difference in price
3. Feed, eggs and chicks are transported by the same vehicle. Washing of vehicle with detergent is not done daily
4. Only 2-3 hens brood chicks if 500 chicks are brought from a hatchery
5. High production loss.
6. Role played by middleman
7. Informal importation of Indian poultry
8. Cold chain/ No inverter in vaccine supplier
9. No vaccination practice in local poultry
10. Broilers cannot be sold in time
11. Insurance policy and practice differs for poultry. It is tedious
12. Drugs and vaccines very expensive
13. Vaccine failure
14. Hatchery generally provides chicks of very low quality or local breed in which hatching % is less than 2%. (Standardize the hatcheries to produce reliable and standard chicks)

Sunsari district

Key informants/ Security personnel's suggestions/ experiences

Problems:

- Local body provides permission/ registration to many poultry farms without taking technical advice from to Veterinary staff/ Veterinary Hospital.
- No vaccination practice in local poultry
- Inadequate coordination at different level. Problems of grass-root level are not responded by higher level
- Sanitation of vehicle is not maintained by the suppliers (Feed, eggs, chicks, drugs, etc. are supplied from a single point (supplier) and same vehicle which may play a great role in the spread of the poultry diseases)
- No proper surveillance except during outbreak of HPAI. Only passive surveillance done. Where to report still not clear officially
- Movement depends on price factor. (Dewanjunj has 22-25 poultry farms to show farms.
- Ghuski and Harinagara are the most important routes of informal importation (400-500 chickens / day) and sales locally. In every 100 Meter there is motorable road for entry. 6 Poultry farms in Ghuski are to be reviewed for suitability).
- Low public awareness
- No needy antibiotics and vet drugs registered in DDA
- Drugs without MRP are freely sold in the market

- Cold chain not maintained by vaccine supplier and vaccinators.

Suggestions:

- Minimum rate/ Price fix by Government for each commodity
- Application of strict farm registration system
- Monitoring by a joint team
- Motivation to youth of bordering area
- Provision of single gate system in one Rural Municipality located at border
- Remove poultry from the bordering areas or discourage it.

Traders' major problems

- Customs tax high for poultry equipments and feed
- Open border
- Soft loan not given to small poultry farmers
- Farms at bordering place are increasing to informal trades. They supply trucks with chicks even during daytime
- Difficult to compete with the price of multi-national companies
- Subsidy not accessible to real farmers/ traders
- Complicated industry registration process
- Very costly vet medicine, supplements and vaccine
- Sub -standard drugs in the market
- Unavailability of needy registered drugs in the markets
- Weak Quarantine mechanism
- No maize/ maize mission in Sunasari district
- No mustard cultivation practice in the district
- No egg- powder plant in the district

Farmers' problems

- Market rate fluctuating. No Market rate control
- Very costly feed and chicks
- Monopolized rate of vet drugs and vaccines. In many cases there is no MRP in label
- No vaccination practice in local poultry
- Application of On-line system is not possible to smallholders
- All rates are monopolized by big traders and big farmers
- No maize production zones
- No recording system in farms
- No market management for broiler and no market rate information given to the real farmers
- Price of eggs not matched with that of feed
- No control in production of chicks by small hatcheries.
- Irregular labour availability
- No maize and mustard or soya cultivation policy in Sunasari
- No proper recording system and no economic analysis in farms, hatcheries and feed mills
- Regular informal entry of both broiler and local birds from Indian border side (both gift/*pewa* and commercial purpose)

Annex – 10: List of participants - FGD and KII

Kathmandu **Program: Focus Group Discussion - Traders.**
Date: 19th July 2019 **Venue: AQO, Budhanilkantha**

S.N	Name	Organization	Position	Contact Number	Email
1	Mr. Shyam Ku. Maharjan	R.K. Cold store		9851159670	
2	Anuj B.C.	The Rising Hatchery, Kathmandu			
3	Mr. Bhola Pandey	Shambhu Pandey Egg Supplier, Naxal		9849701800	
4	Mr. Shambhu Pandey	Shambhu Pandey Egg Supplier, Naxal		985085236	
5	Mr. Ajay K. C.	Nilakantha Hatchery, Hattigauda		9843303132	
6	Mr. Jang Bdr. B.C.	Nepal Chicken sales Organization, Baneswor		9841338719	
7	Mr. Dibesh Thapa	Ban Devi Vet Pharma, Balaju		9851110528	
8	Mr. Bikram Thapa	Nir Barahi Poultry Farm, Bhangel		9803438434	
9	Mr. Dinesh Raj Mishra	Nepal Poultry Federation, Kathmandu		9851091110	
10	Dr. Dinesh Gautam	Nepal Feed Association, Kathmabdu		9851029137	
11	Mr. Binod Raj Pokharel	Manakamana Vet Center, Hattigauda		9841834219	
12	Mr. Binayak K.C.	Nepal Pellet Feed, Kathmandu		9851238601	
13	Dr. Rupendra Chaulagain	Nepal Poultry Federation, Kathmandu		9851139285	
14	Mr. Rajendra Khadka	Budhanilakantha Municipality	Ward Chief	9851007921	
15	Dr. Parsu Ram Bhusal	Retired	Sr. VO	9851180096	bhusalpr@yahoo.com
16	Dr. Dhan Raj Ratala	FAO- ECTAD Nepal	NPD		
18	Dr. Damodar Sedai	FAO- ECTAD Nepal	Consultant	9841736702	dsedai56@gmail .com
19	Ms. Mitali Maharjan	FAO- ECTAD Nepal	OA	9860920620	mitali.maharjan@fao.org
20	Mr. Narayan Shrestha	VH and LEC, Lalitpur	Sr. Vet Officer	9754203032	nrnshrestha 82@gmail.com
21	Mr. Kaji Shrestha	Vet Section, Kathmandu	Vet Officer	9851092407	
22	Dr. Kishna Chand Thakuri	FAO- ECTAD Nepal	TC	9841453272	
23	Mr. Rome Poudel	FAO- ECTAD Nepal			
24		Aryal Supplier	Driver	9851171676	

Date: 19th July 2019
Program: Focus Group Discussion - Poultry Farmers
Venue: AQO, Budhanilkantha

S. N.	Name	Organization	Location	Contact Number	Email
1	Mr. Suman Tthebe	Sabin Poultry Farm	Dharampur	9823152033	
2	Mr. Raj Maharjan	Sabin Poultry Farm	Dharampur	9823319270	
3	Mr. Tek B. Khadka	Anugya Poultry	Budhanilkantha	9841386958	
4	Mr. B. K. Puri	Panchakannya Agri Farm	Nagarjun Na Pa-7	9851101226	
5	Ms. Pratikshya Adhikari	Poultry Farm	Balaju	9867742624	
6	Ms. Bindu	Baglung Kalika Farm	Balaju	9851154704	
7	Mr. Ramesh Bhandari	Sagarmatha Poultry Farm	Budhanilkantha	9869579776	
8	Mr. Uttam Sigdel	Sagarmatha Poultry Farm	Budhanilkantha	9861219359	
9	Ajuna Shrestha	Chunikhel Krishi Farm	Chunikhel, Kathmandu	9849997020	
10	Mr. Hira Lal Rokaya	Broiler Farm	Go. Na Pa -7 Sundarijal	9841764382	
11	Mr. Sri Krishna K.C	Budhanilakantha Municipality -13	Wadr chairman	9851048297	
12	Dr. Parsu Ram Bhusal	Retired	Sr. VO	9851180096	bhusalpr@yahoo.com
13	Dr. Dhan Raj Ratala	FAO- ECTAD Nepal	NPD		
14	Dr. Damodar Sedai	FAO- ECTAD Nepal	Consultant	9841736702	dsedai56@gmail .com
15	Ms. Mitali Maharjan	FAO- ECTAD Nepal	OA	9860920620	mitali.maharjan@fao.org
16	Mr. Narayan Shrestha	VH and LEC, Lalitpur	Sr. Vet Officer	9754203032	nrnshrestha 82@gmail.com
18	Mr. Kaji Shrestha	Vet Section, Kathmandu	Vet Officer	9851092407	

Date: 20th July 2019
Program: Key Informant Interview/ Government Official and security personnel
Venue: AQO, Budhanilkantha, Kathmandu

S.N.	Name	Organization	Position	Contact Number	Email
1	Mr. Uddhav Kharel	Budhanilkantha Municipality	Mayer	9851269111	bnkmayeroffice@gmail.com
2	Mr. Narayan Shrestha	VH and LEC, Lalitpur	Sr. Vet Officer	9754203032	nrnshrestha 82@gmail.com
3	Mr. Kaji Shrestha	Vet Section, Kathmandu	Vet Officer	9851092407	
4	Mr. Shiv P. Adhikari	VSTA	Vet Technician	9851003252	shiv269@gmail.com
5	Mr. Raghu Ram Devkota	JTA	Vet Technician	9849248832	
6	Mr. Parsu Ram Bhusal	Retired	Sr. Vet Officer	9851180096	bhusalpr@yahoo.com
7	Mr. Suman Baniya	Police Section, Budhanilkantha	Sub-inspector	9851282320	sumanbaniya13@gmail.com
8	Mr. Karna Bahadur	JTA	Vet Technician	9849539998	
9	Bikash Adhikari	VSTH	Vet Technician	9851077906	
10	Dr. Shree Ram Adhikari	Animal Quarantine Office Kathmandu	Chief	9851110876	sradhikari@gmail.com
11	Mr. Bala Krishna Shrestha	Budhanilakantha, Ward -3 of Municipality	Chairman	9841339210	
12	Mr. Prakash Adhikari	AQO, Kathmandu	OA	9843342689	
13	Dr. Dhan Raj Ratala	FAO- ECTAD Nepal	NPD		
14	Dr. Damodar Sedai	FAO- ECTAD Nepal	Consultant	9841736702	dsedai56@gmail .com
15	Ms. Mitali Maharjan	FAO- ECTAD Nepal	OA	9860920620	mitali.maharjan@fao.org
16	Mr. Rome Poudel	FAO- ECTAD Nepal			

Poultry Value Chain - Bhaktapur
Poultry Traders **Date: 22/07/2019**

S.N.	Name	Organization	Post	Contact No
1	Narayan Hari Khatri	Nepal Feed Industry association	a.i Chairman	9851021960
2	Rajesh Karanjit	Sukra Vet Med Distributors	Proprioter	9851117944/ 016632371
3	Tulsi Ram Dhukhwa	Poultry Entrep. Federation	Chairman	9851133835
4	Umesh Lal Pradhan	Bhaktapur Municipality, Livestock Section	Vet Officer	9841754184
5	Dr Bala Ram Kisi	Nepal Hatchery Industry Association	General Secretory	9851042882
6	Ganga P. Suwal	Sagar Poultry Breeding Farm	Proprioter	9851024371
7	Shiv Ram Shrestha	Vet Hospital	Livestock Dev. Officer	9841409025
8	Dipendra Shrestha	Kavrepalanchowk Feed, Suryabinayak	Driver	9801063214
9	Suman Karki	Dadhikot	Driver	9869182760
10	Baikuntha Adhikari	Dadhikot	Driver	983215504
11	Dr. Narayan Shrestha	Vet Hospital	Sr. Lives. Officer	9754203032
12	Dr. Damodar Sedai	FAO- ECTAD Nepal	NC	9841736702
13	Mitali Maharjan	FAO- ECTAD Nepal	OA	
14	Rome Poudel	FAO- ECTAD Nepal	Driver	
15	Amrit Shrestha	Vet Hospital		
16	Laxman Gayak	Bharatpur	Driver	9819225559

Poultry Farmers- Bhaktapur **Date: 22/07/2019**

S.N.	Name	Organization	Address	Contact No
1	Pan Kumar Karki		Sipadol	9841470147
2	Raja Ram Bastola	Garg Sri Krishi Sahakari Sanstha	Cha Na Pa -6	9813889400
3	Tek Prasad Bajgain		Surya Binayak	9841257431
4	Ram Prasad Acharya	R. P Poultry Farm	Jhaukhel	9851039971
5	Indra Ghising	Temal Poultry Farm	Jhaukhel	9851168814
6	Niraj Khaiju	Jitpur Poultry Farm	Jitpur	9851125854
7	Purusottam Baniya	Pratima Poultry Farm	Cha Na Pa -6	9851009704
8	Krishna Murari Gelal	Thimi Na Pa	Madhyapur	9841632754
9	Janak Gelal	Thimi Na Pa	Madhyapur	9841134557
10	Saurav Gelal	Thimi Na Pa		9860116889

Government Officials and security personnel - Bhaktapur **Date: 23/07/2019**

S.N.	Name	Organization	Post	Contact No
1	Thar Ku. Thapa	Vet Section Madhyapur	Vet assistant	9841431270
2	China Lama	Vet Section	Vet JTA	9851154785
3	Kamal Raman Bhattarai	Bhadgaun Police Sector, Jagati	Police Inspector	9852090460
4	Rishi Ram Lamichhane	Vet Section, Changu	Livestock Officer	975100463
5	Madan Ku. Singh	Vet Section, Suryabinayak -9	Vet Technician	9841394532
6	Umesh Lal Pradhan	Municipality, Bhaktapur	Vet Officer	9841754184
7	Shiv Ram Shrestha	Vet Hospital	LDO	9841409025
8	Dr. Narayan Shrestha	Vet Hospital	SLDO	
9	Dr. Kishan Chand Thakuri	FAO-ECTAD Nepal	Tech. Coordinator	
10	Dr. Damodar Sedai	FAO-ECTAD Nepal	NC	
11	Mitali Maharjan	FAO-ECTAD Nepal	OA	
12	Rome Poudel	FAO-ECTAD Nepal	Driver	
13	Amrit Shrestha	Vet Hospital		

Poultry Value Chain Study - Lalitpur
Farmers **Date: 28/7/2019**

S.N	Name	Organization	Address	Contact No	Email
1	Anil Maharjan	Poultry Farm	Sanka Devi Mahalaxmi -8	9849933330	metalkills7207@gmail.com
2	Prem Bhandari	Poultry Farm	Sanka Devi Mahalaxmi -8	9808765290	
3	Kabindra Rai	Poultry Farm	Luvu	9849285879	
4	Diwakar K.C	Poultry Farm	Bungmati	9841214411	diwakarkc@hotmail.com
5	Radhe Shyam Basnet	Kalpabrishka Agri Farm	Chapagaun	9751072617	basnetradheshyam@gmail.com
6	Karna B. Tamang	Poultry Farm	Bungmati	9861577875	
7	Sabita Baniya	Sabit a Agro Farm	Godawari 13	9849199974	
8	Jit Lal Shrestha	Poultry Farm		9823044802	
9	Man B Rawal		Bungmati	9802003711	

Poultry Traders - Lalitpur **Date: 28/7/2019**

S.N	Name	Organization	Position	Contact No	Email
1	Dilli Raj Poudel	Pancharatna Feeds	Sales Officer	9801031498	dillimina@gmail.com
2	Dinesh Subedi	Panchakannya Poultry		9851159410	subedidh03@gmail.com
3	Madhav P Ghimire	Kaleshwor Poultry	Propritor	9851004036	
4	Nil B Shashi	Champapur Hatchery	Director	9851032781	nilsashi45@ggmail.com
5	Ganesh Lal Desar	Desar Poultry	Propritor	9851000975	
6	Bijaya Lal Desar	Kathmandu Hatchery	Director	9851004034	
7	Ganga B Shrestha	Vet Hospital		9841453199	
8	Dr. Narayan Shrestah	Vet Hospital and LSEC	Chief		
9	Dr. Dhan Raj Ratala	FAO- ECTAD Nepal	NPD		
10	Kisan Chand Thakuri	FAO- ECTAD Nepal			
11	Dr. Damodar Sedai	FAO- ECTAD Nepal		9841736702	
12	Rome Poudel	FAO- ECTAD Nepal			
13	Sujan Shrestha	FAO- ECTAD Nepal			
14	Mitali Maharjan				
15	Hari K. Shrestha	Supplier	Driver	9801031489	

Government officers, security personnel and key informants **Date: 29/7/2019**

S.N.	Name	Organization	Position	Contact No
1	P.R. Thakur	Godavari Municipality	Thaiba	9851084670
2	Sri Ram Ghimire	Mahalaxmi Municipality	Lamatar	9741047482
3	Ishwor P Ghimire	Bagmati Rural Municipality	Bhatte danda	9851055306
4	Mani Ram Adhikari	Godavari Municipality		9841699297
5	Dev Sundar Mairta	Godavari Municipality	Taukhel	9841404187
6	Rajendra Bista	Lalitpur Municipality		9841830969
7	Punam Niraula	Lalitpur Municipality Ward No -5	Ward Chairman	9849518687
8	Ganga B. Shrastha	Vet Hospital and LSEC		
9	Dr. Narayan Shrestha	Vet Hospital and LSEC	Chief	
10	Dr Dhan Raj Ratala	FAO- ECTAD Nepal	NPD	
11	Mitali Maharjan	FAO- ECTAD Nepal	OA	
12	Kisan Chand Thakuri	FAO- ECTAD Nepal	TC	
13	Dr. Damodar Sedai	FAO- ECTAD Nepal	NC	9841736702
14	Rome Poudel	FAO- ECTAD Nepal		
15	Sujan Shrestha	FAO- ECTAD Nepal		
16	Uma Bista	Vet Hospital and LSEC		
17	Arjun Bhattarai	Vet Hospital and LSEC		

Chitwan
Program: Focus Group Discussion - Traders **Venue: NADIL, Bharatpur**
Date: 4th Nov 2019

S.N	Name	Organization	Location	Contact Number	Email
1	Mr. Dinesh Kattel	Surya Veterinary	Chitwan	9855062795	kattel dinesh@gmail.com
2	Mr. Kapil Babu Khanal	Divya Poultry Farm	Chitwan	9855055398	khanakkapil@gmail.com
3	Mr. Dirgha Man Shrestha	Everest Poultry	Chitwan	9851006852	dinashrestha@gmail.com
4	Mr. Tika Ram Pokharel	Divya Hatchery Pvt. Ltd.	Chitwan	9855055389	tika383@gmail.com
5	Mr. Bala Chandra Khanal	District Feed Association	Chitwan	9855063860	khanal860@yahoo.com
6	Mr. Shiv Ram KC	Nepal Eggs and Poultry Association	Chitwan	9855060109	
7	Mr. Ram Hari KC	Nepal Eggs and Poultry Association	Chitwan	9857640024	
8	Mr. Aman Subedi	Abin Poultry	Chitwan	9855063311	
9	Mr. Ram Krishna Aryal	R. K. Poultry	Chitwan	9855058809	
10	Mr. Laxman Ray	Kalyan Hatchery	Chitwan	9819225559	
11	Dr. Chet Narayan Kharel	NADIL	Chitwan	9845099335	
12	Dr. Parshuram Phunyal	NADIL	Chitwan		
13	Dr. Damodar Sedai	FAO- ECTAD		9841736702	Damodar.Sedai@fao.org
14	Mr. Sangharsha Bhattarai	FAO			sangharsha.Bhattarai@fao.org
15	Ms. Mitali Maharjan	FAO- ECTAD		9860920620	mitali.maharjan@fao.org
16	Mr. Rome Poudel	FAO			rome.poudel@fao.org
17	Bhanu Bhakta Sapkota	NADIL		9819225559	
18	Mr Raki Thapa	Bharatpur, Chitwan			

Program: Focus Group Discussion - Poultry farmers **Venue: NADIL, Bharatpur**

S.N	Name	Organization	Location	Contact Number	Email
1	Mr. Mitra P. Sharma	Poultry Farm	Jagatpur, Chitwan	9848022361	
2	Mr. Suman Khanal	P.B.S Poultry Farm	Ratna Nagar, Tandi, Chitwan	985506618	sumankhanal254@yahoo.com
3	Mr. JanaK Man Shrestha	Gayatri Poultry Farm	Bharatpur-12, Chitwan	9855047071	Gayatri.P.Farm@yahoo.com
4	Mr. Mek Bahadur Khadka	Khadka Poultry Farm	Bharatpur - 21, Chitwan	9845026787	

5	Mr. Narayan Chalise	Chalise Poultry Farm	Bharatpur - 21, Chitwan	98550529886	chalise_narayan96@yahoo.com
6	Mr. Ravi P. Poudel	R.P Poultry Farm	Bharatpur - 16, Chitwan	9855063736	ravipoudel538@gmail.com
7	Mr. Netra B. Kshetri	Mama Bhanja Integrated Agriculture Farm	Ratna Nagar-10, Tandi, Chitwan	9855061534	netrakshetri534@gmail.com
8	Mr. Dob Raj Khatri	Deva Poultry Farm	Khairahani Municipality -13, Chitwan	9845959515	doba123@gmail.com
9	Mr. Bipin Karki	Poultry Farm	Madhyabindu-15 Gadarakhola, Chitwan	9811904384	bipinkarki62@gmail.com
10	Mr. Ramesh Bohara	Marshal Poultry Farm	Bharatpur - 14, Chitwan	9865234971	bohararamwsh2014@gmail.com
11	Dr. Chet Narayan Kharel	NADIL	Chitwan	9845099335	
12	Dr Parshuram Phunyal	NADIL	Chitwan		-
13	Dr. Damodar Sedai	FAO-ECTAD		9841736702	Damodar.Sedai@fao.org
14	Mr. Sangharsha Bhattarai	FAO			sangharsha.Bhattarai@fao.org
15	Ms. Mitali Maharjan	FAO-ECTAD			mitali.maharjan@fao.org
16	Mr. Indu Raya Yadav	NADIL		9845478840	yadavindu17@gmail.com
17	Bhanu Bhakta Sapkota	NADIL		9819225559	

Program: KII - Government officials and security personnel **Venue: NADIL, Bharatpur**

S.N	Name	Organization	Location	Contact Number	Email
1	Dr. Chet Narayan Kharel	NADIL	Chitwan	9845099335	kharelcn@gmail.com
2	Dr. Parshuram Phunyal	NADIL	Chitwan		parsuphuyal@gmail.com
3	Mr. Sita Ram Marahattha	NADIL	Chitwan	9845398494	mrtsitaram@gmail.com
4	Mr. Shalik Ram Poudel	Ratnanagar Municipality, Livestock Section	Chitwan	9845048499	pshalik22@gmail.com
5	Dr. Daya Ram Chapagain	Vet. Hospital and LSEC	Chitwan	9855063785	bbchapagain@gmail.com
6	Mr. Megha Raj Dhakal	Bharatpur Metro-politan city, Livestock Section	Chitwan	9855033277	dhakalmegharaj318@gmail.com
7	Mr. Rudra Kumar Shrestha	Khairahani Municipality,	Chitwan	9845114767	khairahani2071@gmail.com

		Livestock Section			
8	Mr. Dinesh Ku. Singh	Police Check post, Ram Nagar	Chitwan	9845061856	-
9	Dr. Dinesh Sah	Animal Quarantine CP, Ram Nagar	Chitwan	9845052179	shahdinesh694@gmail.com
10	Dr. Khadak Singh Bisht	FAO	Lalitpur		Khadak.Bisht@fao.org
11	Dr. Damodar Sedai	FAO- ECTAD		9841736702	Damodar.Sedai@fao.org
12	Mr. Sangharsha Bhattarai	FAO			sangharsha.Bhattarai@fao.org
13	Ms. Mitali Maharjan	FAO- ECTAD			mitali.maharjan@fao.org

Poultry Traders - Kaski **Venue: Veterinary Laboratory**

S. N	Name	Organization	Position	Contact Number	Email
1	Dr. Ashesh Bhattarai	Gandaki Poultry Business Association	Secretary	9856028812	ahseshbhattarai812@gmail.com
2	Binod Bhandari	B. BhandariHatchery Pvt. Ltd	Proprietor	9856031750	bbhandarihatchery@gmail.com
3	Yubaraj Adhikari	Bindabasini Breeding	Proprietor	9856024365	yubaraj9790@gmail.com
4	Guru P. Poudel	Kanchan Poultry Pvt. Ltd.	Proprietor	9856028355	poudelguru@2016@gmail.com
5	Gyan Hari Acharya	Supadeoralimeat Zone Pvt. Ltd.	Chairperson	9856030664	acharya_gyanu@gmail.com
6	M. P. Dhimal	Mosom Fresh House		9846024370	dhimal@gmail.com
7	Surya Baral	Fewa Meat Products	Director	9856029275	baralsurya@ggmail.com
8	Bharat Regmi	Vet Lab	Vet Officer	9845794290	regmibharat2008@gmail.com
9	Ganesh K.C.	Vet Lab	Vet Officer	9856080909	ganeshkc.vet@gmail.com
10	Moti P. Poudel	NVCDA	Member	9856032189	motipoudel@gmail.com
11	Dr. Kedar Raj Pandey	Vet Lab	SVO	9846020282	kedarrajpandey1@gmail.com
12	Babu Ram Giri	PEF	President	9856021690	brgiri7@hotmail.com
13	Dr. Khadak S. Bisht	FAO	SAAHS	9801020239	khadak.Bisht@fao.org
14	Dr. Damodar Sedai	FAO- ECTAD		9841736702	Damodar.Sedai@fao.org
15	Mr. Sangharsha Bhattarai	FAO			sangharsha.Bhattarai@fao.org
16	Ms. Mitali Maharjan	FAO- ECTAD		9860920620	mitali.maharjan@fao.org
17	Rome Poudel	FAO	Driver	984124424	rome.poudel@fao.org

Poultry Farmers - FGD (participants)

S.N	Name	Organization	Location	Contact Number	Email
1	Dipak Dhamala	Tri-Kanya Poultry	Pokhara-32	9856032623	-
2	Ghana Shyam Dhamala	Dhamala Poultry	Pokhara-32	9856047110	-
3	Gyan B. Pun	Pun Poultry	Pokhara- 16	9856032056	
4	Rajendra Adhikari	Lekhanath Hatchery and Integrated Agri. Farm	Pokhara- 27	9856056222	-
5	Dr. Ashesh Bhattarai	Gandaki Poultry Business Association	Secretary	9856028812	ahseshbhattarai812@gmail.com
6	Babu Ram Giri	Vishal Agro-vet	Owner	9856021690	brgiri7@hotmail.com
7	Moti P. Poudel	NVCDA	Member	9856032189	motipoudel@gmail.com
8	Dr. Khadak S. Bisht	FAO	SAAHS	9801020239	khadak.Bisht@fao.org
9	Dr. Damodar Sedai	FAO-ECTAD		9841736702	Damodar.Sedai@fao.org
10	Mr. Sangharsha Bhattarai	FAO			sangharsha.Bhattarai@fao.org
11	Ms. Mitali Maharjan	FAO-ECTAD		9860920620	mitali.maharjan@fao.org
12	Rome Poudel	FAO	Driver	984124424	rome.poudel@fao.org

Government Officials and security personnel

S.N	Name	Organization	Position	Contact Number	Email
1	Dr. Man B. Pun	DLFD, Kaski	Director	9846029182	mbpun2312@yahoo.com
2	Dr. Kedar Raj Pandey	Veterinary laboratory	SVO	9846020282	kedarrajpandey1@gmail.com
3	Dr. Shova Sharma	VHLSEC	SLDO	9845053920	sharmashova15@gmail.com
4	Dr. Mahendra Malla	NLBO	LDO	9841285095	hereismahendra@gmail.com
5	Dr. Bharat Regmi	Veterinary laboratory	Vet Officer	9845794290	regmibharat2008@gmail.com
6	Rajendra Lamichhane	Pokhara Municipality	Officer -VI	9856047637	lamichhanerajendra62@gmail.com
7	Dr. PreranaSedhain Bhattarai	DLFD, Kaski	SVO	9846022736	preranabhattarai.pbs@gmail.com
8	Dr. Rajesh Ku. Chaudhary	DLFD, Kaski	Vet Officer	9845038503	razeshchaudhary@gmail.com
9	Ujawal Raj Chiluwal	Nepal Police	ST	9856060185	chiluwalujwal@ggmail.com
10	Prem B. Thapa	Nepal Police	Astt. Sub-	9844813073	prem138@gmail.com

			Inspector		
11	Rupendra Singh Dhami	Nepal Police	Head Constable	9847818930	srupendra51@gmail.com
12	Dr, Ganesh K.C	Veterinary laboratory	Vet Officer	9856080909	ganeshkc.vet@gmail.com
13	Dr. Rishi P Sapkota	Minis. Of Land Management, Ari. And Cooperative	SVO	9847804034	rikkisapkota@gmail.com
14	Dr Khadak S. Bisht	FAO	SAAHS	9801020239	khadak.Bisht@fao.org
15	Dr. Damodar Sedai	FAO- ECTAD		9841736702	Damodar.Sedai@fao.org
16	Mr. Sangharsha Bhattarai	FAO			sangharsha.Bhattarai@fao.org
17	Ms. Mitali Maharjan	FAO- ECTAD		9860920620	mitali.maharjan@fao.org
18	Rome Poudel	FAO	Driver	984124424	rome.poudel@fao.org

Poultry Traders - Jhapa **Venue: Vet Hospital and LSEC**

S.N.	Name	Organization	Post	Contact No
1	Rubina Thapa	Pig and Poultry Farm	Proprietor	23456523
2	Rajan Bastola	Agro-vet Association		9804905345
3	Chandra P. Phunyal	Poultry entreprenuer		980613912
4	Anjani Kumar Agrawal	Layers' entreprenuer		9852682727
5	Bharat Wodari	Hatchery Association		9852673416
6	Chudamani Magar	Eggs Production Association		9814942557
7	Santhsh Bhattarai	Bhadrapur -23, Jhapa		023-456640
8	Dr. Ganga Ram Yadav	VHLSEC, Jhapa	Hospital Incharge	9842297061
9	Dr. Bishal Pokharel	VHLSEC, Jhapa	LDO	9843397587
10	Menuka Karki	VHLSEC, Jhapa	Office Assistant	
11	Sangharsha Bhattarai	FAO- Nepal	ICT Manager	
12	Dr. Damodar Sedai	FAO- Nepal	PVC Specialist	
13	Uttam Ku. Shahi	FAO- Nepal	Driver	

Poultry Farmers - FGD (participants)

S.N.	Name	Organization	Address	Contact No
1	Kalpana Subba	Broiler Poultry Farm	Jhapa	9814059357
2	Bimal Adikari	Layers Poultry Farm	Jhapa	9813846464
3	Rajan Gautam	Local Poultry Farm and Quail	Jhapa	9844611992
4	Rudra Karki	Giriraja Poultry Farm	Jhapa	
5	Bhesha Raj Timsina	Megha Krishi Farm	Jhapa	9844664354
6	Kishor Karki	Broiler Poultry Farm	Jhapa	9813733039
7	Binod Kharel	Layers Poultry Farm	Jhapa	9816360210
8	Suresh Adhikari	Broiler Poultry Farm	Jhapa	9824094734
9	Deepak Budhathoki	Broiler Poultry Farm	Jhapa	9817036380
10	Ganesh P. Bhattarai	Broiler Poultry Farm	Jhapa	9842045448
11	Dr. Ganga Ram Yadav	VHLSEC, Jhapa	Hospital Incharge	9842297061

12	Dr. Bishal Pokharel	VHLSEC, Jhapa	LDO	9843397587
13	Sangharsha Bhattarai	FAO- Nepal	ICT Manager	
14	Dr. Damodar Sedai	FAO- Nepal	PVC Specialist	

Government Officials and security personnel

S.N.	Name	Organization	Post	Contact No
1	Ser B. Rana Magar	Nepal Police	Check point incharge	9812903520
2	Yam Ku. Shrestha	Nepal Police	Inspector	9852655408
3	Mohan Thapa	Nepal Police	Inspector	9852090288
4	Mukesh Ku. Singh	AQOffice, Kankadvitta	Vet. Officer	9852663987
5	Prakash Khandka	Nepal Police	PC	9806041461
6	Moha Prasad	Mechi Na Pa	Livestock Officer	9842657949
7	Tej B. Paudel	Kankai Na Pa	Livestock Officer	9816923413
8	Yam B. Limbu	Bhardapur Na Pa	Livestock Officer	9842628805
9	Sabita Kumari Dahal	Birtamod Na Pa	Officer	9842639592
10	Sobah Khanal	Nepal Police	Inspector	9842407640
11	Chhabilal Subedi	Bhadrapur Na Pa, Bhadrapur-7	Livestock Officer	9842626677
12	Dr. Ganga Ram Yadav	VHLSEC, Jhapa	Hospital Incharge	9842297061
13	Dr Bishal Pokharel	VHLSEC, Jhapa	LDO	9843397587
14	Sangharsha Bhattarai	FAO- Nepal	ICT Manager	
15	Dr Damodar Sedai	FAO- Nepal	PVC Specialist	
16	Prem Kumari Tumsing	VHLSEC, Jhapa	Office Assistant	
17	Uttam Ku. Shahi	FAO- Nepal		

Poultry Traders - Sunsari Venue: Vet Hospital and LSEC

S.N.	Name	Organization	Post	Contact No
1	Komal Kumar Chaudhary	Poultry and Meat Trader	Member	9852045112
2	Bishnu Ku. Niraula	Vet chem and drug association, Sunasari	President	9842025888
3	Duryodhan Niraula	Nepal Anda Utpadan Sangh	President	9852059356
4	Manoj Neupane	Nepal Dana Utpadan Sangh, Sunasari	Treasurer	9852055339
5	Kul Bahadur Kunwar	Poultry and Meat Byabasai Sangh	Chairperson	9807065233
6	Naba Raj Pokharel	Fish and Masu Byabasai Sangh, Itahari	Secretary	9852048680
7	Shiv Shankar Yadav	Poultry and Meat Byabasai Sangh	Co- Chairman	9863735000
9	Surendra Ku. Majhi	Poultry and Meat Byabasai Sangh	Treasurer	9852057722
10	Ramesh Simkhada	Satya Sai Hatchery	Supervisor	9817316398
11	Rajendra Raya	VHLESC	Chief	9852055625
12	Dr Manoj Ku. Mahato	VHLESC	Vet Officer	9845113098
13	Sangharsha Bhattarai	FAO- Nepal	ICT Manager	
14	Dr Damodar Sedai	FAO- Nepal	PVC Specialist	
15	Uttam Ku. Shahi	FAO- Nepal	Driver	

Poultry Farmers - FGD (participants)

S.N.	Name	Organization	Address	Contact No
1	Nabin Chaudhary	Baraha Livestock Pvt. Ltd	Sunsari	9842312222
2	J.K. Subba	Poultry Farm and Sani Agro-Vet	Sunsari	9862040158
3	Dinesh Karki	Sandip Poultry	Sunsari	9863004825
4	Ritesh Shrestha	New Shrestha Poultry Farm	Sunsari	9842368683
5	Daulat Raj Mehata	D.R. Poultry Farm	Sunsari	9819012916
6	Shravan Mehata	Prince Poultry Farm	Sunsari	9804329723
7	Manoj Karki	Renuka Krishi Farm	Sunsari	9852054143
8	Suman Ku. Shrestha	Shrestha Krishi Farm	Sunsari	9811321818
9	Narayan P. Khatiwada	Prakashpur Krishi tatha poultry Farm	Sunsari	9842075094
10	Shova Pandey	VHLESC	Sunsari	9842291476
11	Sangharsha Bhattarai	FAO- Nepal	ICT Manager	
12	Dr Damodar Sedai	FAO- Nepal	PVC Specialist	
13	Dr Manoj Ku. Mahato	VHLESC	Vet Officer	9845113098

Government Officials and security personnel

S.N.	Name	Organization	Post	Contact No
1	Dr Anit Ghimire	AQCP, Bhantabari	Quarantine Officer	9842249756
2	Mahendra Ku. Paikra	Dharan Na Pa	Livestock Officer	9842037599
3	Durga B. Shrestha	Itahari Na. Pa.	Veterinary Officer	9842024111
4	Subas Rai	Area Police Office, Dewanganj	Police Constable	9825356577
5	Hari Narayan Mehata	Dewangunj RU. Pa.	Veterinary Officer	9842148764
6	Manoj Ku. Khadka	Area Police Office, Bhatabari	Police Constable	9862180727
7	Shyam Poudel	District Police Office, Sunasari	Sub- Inspector	9852690177
8	Umesh K.C.	Area Police Office, Itahari	Astt. Sub- Inspector	985209065
9	Pramod Jha	Duhabi Na. Pa.	Livestock Officer	9862815250
10	Khem B. Kunwar	Police Check Post, Barahakhetra		986261136
11	Mohan Ku. Singh	Koshi Ga Pa. Laukahi	Officer -VI	9842064059
12	Rajendra Raya	VHLESC	Chief	9852055625
13	Dr Manoj Ku. Mahato	VHLESC	Vet Officer	9845113098
14	Chineshwor Mehata	VHLESC	Officer -VI	9842046059
15	Sangharsha Bhattarai	FAO- Nepal	ICT Manager	
16	Dr Damodar Sedai	FAO- Nepal	PVC Specialist	
17	Uttam Ku. Shahi	FAO- Nepal		

Annex- 11: Vaccine importers and distribution

S.N	Name of the Agro-vet	Address	Propioter	Contact No	Imported vaccine	Volume supplied in 3 months	Producing Company/ Country	Distributed to	Cold room capacity
1	Sungava Vet Pharma	Tripureshwor, Kathmandu	Bharat Pandey	01-4256243	AE + Fowl Pox, Fowl Cholera, IB, IBD, MD, ND, NDF strain, NDR2B, ND B1, ND+ IB, Reo Virus Vaccine		Hester Bioscience, CaVac (korea), Biovet (brazil), Meral-Boriem-Inelim (USA, Italy	kathmandu, Lalitpur, Bhaktapur, Nuwakot, Dhading, Kavrepalanchowk, Chitwan, Nabalparasi, Parsa, Rautahat, Tanahun, Kaski, Gorkha, Lamjung, Rupandehi, Nepalgunj, Dhanagadhi, Surkhet, Pyuthan, Birtamod, Damak, Jhapa, Itahari	10x 8 sq. feet and 8 x 8 sq. feet
2	Munal Bio-Vet Pharma	Kalanki	Rohit Niraula	9.851E+09	ND, IBD, IB, ND+ IB, Fowl pox, MD (HBD), Reo +ND+IBD+IB, Litchi heart disease vaccine	7500 Vials (total)	Israel, Indonesia, USA	kathmandu, Lalitpur, Bhaktapur, Parsa, Janakpur, Kaski, Dang, Rupandehi, Nepalgunj, Dhanagadhi, Jhapa, Morang	10x12 sq. feet
3	Gunras International Pvt. Ltd.	Teku	Om Prakash Gurung 9851061249/ Ganesh Gurung	9.842E+09	ND, IBD, Lasota, NDB1	900-1200 vials of each vaccine	Croatia, Korea, USA	Chitwan, Rupandehi, Makwanpur, Rautahat, Mahottari, Dhanusa, Jhapa, Morang, Banke, Dhanagadhi, Parsa, Mahendranagar, Surkhet, Kaski and Dang	10x 9 sq. feet
4	Sabha Intervet	Tahachal, Kathmandu	Ashok Shtestha	4271595/ 9851033961	ND, IBD, IB, ND+ IB, Fowl pox, MD (HBD), Reo +ND+IBD+IB vaccine			Chitwan, Rupandehi, Mahottari, Dhanusa, Jhapa, Morang, Banke, Dhanagadhi, Parsa, Kaski and Dang	

5	Vet Life Pharmaceutical	Tripureshwor, Kathmandu	Santosh Subedi	4260318	RD, IBD, IB, ND+IB, Lasota, Fowl Pox, AE	3000 vials of 1000 and 500 doses- Live	India, Itali, Korea	Kathmandu, Lalitpur, Bhaktapur, Chitwan, butawal, Dangg, Surkhet, Nepalggunj, Dhangadhi, Rautahat, Biratnagar	
6	Rash- Vet International	Tahachal, Kathmandu	Ashok Shtestha	4271595	ND, IBD, IB, ND+ IB, Fowl pox, MD (HBD), Reo +ND+IBD+IB		SEVA Co (USA), Globian Co.	Kathmandu, Lalitpur, Bhaktapur, Chitwan, Rupandehi, Mahottari, Dhanusa, Jhapa, Morang, Banke, Dhanagadhi, Parsa, Kaski and Dang	
7	Kantipur Vet Distributors	Tripureshwor, Kathmandu	Rhishi Badal	9.851E+09	RD, IBD, IB, ND+IB, Lasota, Fowl Pox, AE		India, Itali, Korea	Kathmandu, Lalitpur, Bhaktapur, Chitwan, butawal, Dangg, Surkhet, Nepalgunj, Dhangadhi, Rautahat, Biratnagar	

Annex- 12: Veterinary drugs and biological production Industry

S.N.	Name	Address	Contact No
1	Nimbus International Pvt. Ltd	Balaju Industrial Estate, Kathmandu	
2	National Vet Industries	Kapan, Kathmandu	
3	Serene Pharmaceuticals	Thankot, Kathmandu	
	Veterinary biological Production Industries		
1	National Biological Product Laboratory	Tripureshwor	
2	Hester Company	Kavrepalanchowk	

Annex- 13
Checklists used in the study
Checklist for Poultry farmers

Poultry farmer (Commercial, semi-comm. and Local poultry)						
Check - list for farmers						
1. General information	Date					
Location of poultry farm:						
Latitude (N) of district:						
Longitude (E) of district:						
Number of poultry farms in the district:						
a. Layers						
b. Broilers						
c. Local						
d. Duck						
Major pockets of poultry (name of the places)						
Location of Hatcheries						
Type of production in farm:	No					
a. Layer						
b. Broiler grower (more then 500)						
c. Pullet						
d. Brooder						
e. Day-old- chick						
f. Breeder						
g. Breeder						
h. Hatchery						

i. Local						
Estimated total no. of poultry to date:						
Total chicken production capacity						
2. Movement of poultry and eggs within 3 months (OIE definition)	**Source district**	**Source Rural Municipality/Municipality/ Sub- metro/ Metro-municipality**	**Frequency (3 monthly) times**	**In-route drop**	**Final destination**	**Volume**
Have you brought any poultry or raw eggs from other farm and introduced it in your farm? Y/N. If yes,						
Have you brought any poultry or raw eggs from market or distributors or retailer and introduced it in your farm? Y/N. If yes,						
Have you sold any poultry or eggs from your farm to other farm? Y/N. If yes,						
Have you sent any poultry or eggs from your farm to market / distributor/ retailer? Y/N. If yes,						
3. Movement of vehicle or people within 3 months						
Did your farm get people or vehicle (for inputs or service) coming from other farm? Y/N. If yes,						

Did your farm get people or vehicle (for inputs or service) coming from market / distributor/ retailer? Y/N. If yes,						
Did any service provider/inputs supplier /vehicle go out from your farm to other farm? Y/N. If yes						
Did any service provider/inputs supplier /vehicle go out from your farm to markets? Y/N. If yes						
4. Movement of farm machinery/ equipment/farm accessories / used egg tray or sac within 3 months						
Did you bring any farm machinery/ equipment/ farm accessories from other farm to your farm? Y/N. If yes,						
Disinfection?						
Did you bring any old farm machinery/ equipment/ farm accessories from markets to your farm? Y/N. If yes,						
Did you sell or send out any farm machinery/ equipment/ farm accessories from your farm to other farms? Y/N. If yes,						
Did you sell or send out any farm machinery/ equipment/ farm accessories from your farm to markets? Y/N. If yes,						
5. Movement of poultry manure/ wet litters within 3 months						
Have you brought any poultry manure from other farm and introduced in your land near by poultry shed or used nearby your farm for crop? Y/N. If yes,						

Have you brought any poultry manure from market and introduced in your land near by poultry shedor used nearby your farm? Y/N. If yes,						
Did you send out any poultry manure to other farm/ districts? Y/N. If yes,						
Did you send out any poultry manure to market? Y/N. If yes, In Trip						
6. Movement of poultry feed or feed ingredients in the farm						
Have you brought any poultry feed or feed ingredients from other poultry farm and used in your farm? Y/N. If yes,						
Have you sent out any poultry feed or feed ingredients from your poultry farm to other farms? Y/N. If yes,						
7. Disposal of dead poultry						
Have you Biological pit at farm premise						
If not, how do you dispose dead poultry?						

Checklist for Traders

Check list for traders (Poultry (all types), DOC chick suppliers, commodity federations and associations, agro-vets, feed industry, slaughter houses/place)			
1. General information			
District name:			
2. Number of traders involved in the district			
i.Poultry including DOC supplier (No)			
ii. Eggs supplier (No.)			
iii. Feed mills/ distributers (No)			
iv. Agro-vets (No)			
v. Hatcheries (No)			
vi. Poultry slaughtering places (No)			
vii. Total layer poultry Placement in the district in 3 months (Thousand) (commercial layers			
viii. Total Egg production in district in 1 months (Thousand)			
ix. Total broiler poultry production in the district in 3 months (Thousand)			
x. Number of commercial poultry farms in the district (broiler and layers)			
xi. DOC production in a week			
3. Type of collection in number /volume	**No./ Volume**	**Source district of commodity/ collection**	**Frequency**
a. Layer (per week)			
b. Broiler (per day)			
c. Pullet			

d. Day-old- chick (broiler)			
e. Day-old- chick (layer)			
f. Rural poultry (Giriraja/Kroilers/Color Broilers)			
f. Feeds (MT)			
g. Feed ingredients (MT)			
h. Live poultry vaccines (for agro-vets)			
i. Duck egg/ month			
j. Vaccine Imported/ procured from			
k. Vaccine supplied to			
l. Vaccine type (Live)			
m. Poultry manure (MT) collected from			
4. Poultry Market			
Number of poultry markets in the district for local poultry			
Number of hatbazaar run in a week			
5. Supply information /distribution from the district			
Total no. of poultry including DOC supplied in a week (No)			
Total no. of eggs supplied (No)			
Total volumeof feed / feed ingredients supplied per day (MT)			
Total doses of vaccine supply in 3 months (in 1000 doses)			

Total poultry manure supply in 2 months			
6. Slaughterhouse/ places	**Source district**	**In- route – district**	**Destination – district**
Collection of poultry and eggs from			
Biosecurity status in Slaughterhouse/ places			
Poultry raw meat and meat products supply to			
7. Hatchery people			
What types of chicks do you produce?			
Parent Chick/ commercial chicks/ duckling/ other			
Where do you sell chicks/ducklings? If yes, where?			
8 Waste management			
What do you do the chicks that are not sold?			
a. sell locally			
b. raised in the farm			
c. Dumped			
Where do you dispose dead chicks/ducklings and waste?			

Checklist for Government Officers, security personnel and technicians

1. General information			
District name: Kathmandu			
2. Imports or collected from (volume))			
a. All types poultry entering per day in Kathmandu 1 pick up = 300-400 birds			
b. Layers/ day			
c. Broilers/day			
d. Eggs entering per day			
e. Day-old- chick			
f. Rural poultry (Giriraja/Kroilers/Color Broilers)			
g. Live poultry vaccines (for agro-vets) (in '000 doses)			
h. Duck egg			
i. Vaccine Imported/ procured from			
k. Vaccine supplied to			
l. Vaccine type (Live) imported			
m. Poultry manure (MT) import			
3. Poultry Market			
Number of poultry markets in the district			
Number of hat bazaar run in a week			
4. Supply information /distribution from the district	**Source district volume**	**In- route - district**	**Destination – district**
Total no. of DOC supplied in a week (No)			
Poultry adult **out from the district/ day**			
Total no. of eggs supplied to other districts in 3 month (No)			

Total volume of feed supplied to other districts in a week (MT)			
Total doses of vaccine supply in 3 months (in 1000 doses)			
Total poultry manure supply in 3 months			
5. Slaughterhouse/ places	**Source district**	**In- route – district**	**Destination – district**
Collection of poultry for slaughter and eggs from			
Biosecurity status in Slaughterhouse/ places			
Poultry raw meat and meat products supply to other districts			
6. Waste management			
What do farmers do the chicks that are not sold? Dead			
a. sell locally			
b. raised in the farm			
c. Dumped			
Where do farmers dispose dead chicks/ducklings and waste?			

Checklist for transporter

1.General information		
Name of the transporter		
Address		
Contact No.		
2. Technical information		
Do you transport poultry, eggs and feed?		
Do you transport veterinary vaccine?		
How do you collect DOC, poultry or feeds or feed ingredients?		
a. From rural areas		
b. From commercial poultry		
c. From single farm only		
Do you transport poultry and their products and feeds separately?		
Do you transport poultry and their products and feeds at a time?		
How frequently do you wash and disinfect your vehicle?		
What do you use for disinfection of your vehicle?		
Do you transport poultry manure and dead poultry by your vehicle?		
Your destination for transportation? Commodity?		
a. Poultry (adults)		
b. Dayold chicks		
c. Poultry feeds and feed ingredients		
d. Waste materials including dead birds?		
Volume of goods per trip?		
a.DOC (No.)		
b. Adult and spent hens (No)		
c. Feed and feed ingredients (MT)		
d. Waste materials including dead birds (MT)		
Have you ever observed mass death of poultry during transportation?		
How do you dispose such consignment if it happens to you?		
Delivery of consignment?		
Source to destination		
Distribution in - route also		

Annex- 14: TOR of Poultry Value Chain Expert

- **Familiarize with the project document, work plan and related activities;**
- Assist NPD/Technical coordinator to liaise with other stakeholders in facilitating interaction/collaboration between the project and government authorities to ensure inputs and ownership;
- In consultation and coordination with the NPD and the Regional Animal Health Economist Coordinator, develop/design and carry out internal (district) and cross border (where relevant) Poultry Value Chain and Live Poultry Market study for 7 High risk districts (Jhapa, Sunsari, Chitwan, Kaski, Kathmandu, Lalitpur and Bhaktapur);
- In coordination with other members of the country teams:
    - Prepare assessment framework/inception report and obtain clearance from LTO, RAP;
    - Organize various events such as Focus Group Discussions, KII, and personal contact with Government and related private sector key stakeholders to collect field level poultry value chain data;
    - Coordinate with IT specialist to incorporate value chain mapping (networking);
    - Prepare and submit draft report to NPD and LTO for their review before sharing it with Department of Livestock Services authorities in a national workshop;
    - Incorporate valid suggestions/comments made in the national workshop to finalize the report; and
    - Submit the final report to National Project Director/FAOR for technical clearance from FAO-RAP.

15. Photos

FGD with farmers at Kathmandu

KI with key vet technicians, security people (Kathmandu)

FGD with traders at Kathmandu

KI with key informants at Bhaktapur

FGD with farmers of Lalitpur

KI with Dy. Mayer and field vet technicians, Lalitpur

FGD with traders at Kaski

FGD with traders at Sunsari

Discussion with security personnel and civil servants

Discussion with Key informants at Lalitpur

Pen for keeping poultry

Pen for keeping poultry

Duck farming at Sanglakhola (Kathmandu)

Duckling for sale

Eastern Jhapa border

Poultry farm located very close to border

Guest birds in Jhapa border

Poultry gifted by patents coming to Nepal from India

Border control

Selling of Indian eggs in Sunsari

Selling of Indian eggs at border

Illegal importation of chilled poultry products

Illegal importation of chilled poultry products

Backyard poultry at Balaju (Brought from Jhapa, but not of Nepal)

Hatchery along side highway

DOCs, eggs, feed, drugs and equipment in supplier's shop

Vehicle used for poultry transportation

Single vehicle used for transportation of chicks and feeds

Feeds, chicks and accessories in one vehicle

Poultry transportation in Terai and bordering areas

Poultry transportation in Terai

Egg- box

Feed transportation