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Nepal:
Animal Source Foods Production and Marketing Brief

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Sustainably intensifying smallholder livestock systems to improve human nutrition, health, and incomes

1. Introduction

Nepal's livestock numbers are estimated to be 7.27 million cattle, 5.24 million buffaloes, 10.17 million goats, 0.8 million sheep, 48 million poultry, and 0.37 million ducks (MoLD, 2016). The percentage of improved livestock accounts for only 13% in cattle, 25.9% in buffalo, 4 .6% in sheep, 6.1% in goats, 34.2% in pigs, and 54.2% in poultry (MoAD, 2012). The remaining livestock population are local indigenous breeds which are low in productivity and performance.

In Nepal, the livestock subsector is declining. The Nepal Agricultural Development Strategy (ADS, 2014) has identified the core reason for the decline as low productivity of animals, mainly due to poor husbandry practices by farmers, the genetic inferiority of local breeds, and the poor condition of animal health. Lack of adequate marketing systems and channels for animal products is another major hindrance to the development of the livestock sector. Nepal's supply of animal products is not sufficient to meet the increasing demand for these products. Nepal annually spends more than US$40 million to meet the increasing demand for animal products (Economic Survey, 2014). The import rate of livestock and livestock products is significantly higher than their export rate and this is one of the main reasons of trade imbalance in the country (Economic Survey, 2014).

Given the vital role of the livestock subsector in the country's economy, the 20-year Nepal Agricultural Perspective Plan (APP, 1995), which ended in 2015, identified the livestock subsector as one of the four priority outputs and planned to raise its share in the AGDP to 45%, with a targeted livestock annual growth rate of 6.1%.

As a realization of the importance of the livestock subsector in country's economy, the Government of Nepal (GoN) has formed a separate Ministry of Livestock and Poultry Development (MLPD) in December 2015 to prioritize the activities of the livestock subsector. Under the MLPD, the Department of Livestock Services (DLS) is responsible for promotion, administration and coordination of the livestock activities throughout the country. DLS executes its plans and programs through four directorates: Directorate of Animal Health, Directorate of Livestock Production, Directorate of Livestock Market Promotion and Directorate of Livestock Training and Extension, through five Regional Directorates; and through the 75 District Livestock Services offices (DLSOs), which include 359 livestock service centers and 640 livestock subservice in each sub-district level (DLS, 2016).

2. Production

Animal production and management systems

The animal production system in Nepal is largely influenced by the diverse climate and vegetation that exists in the country's different eco-zones (MoAC, 2004). There are three parallel ecological regions in the country: (1) the Terai (Plains) region (59 m to 610 m), (2) the Hills region (>610 m to 4,877 m); and (3) the Mountain region (>4877 m to 8,848 m). The Mountain, Hill, and Terai regions occupy about 35%, 42%, and 23% of the land area respectively (Wikipedia, 2016). In the ecological zones, Nepal has a diverse climate from subtropical to subtemperate to alpine. The animal production system in Nepal, based on the ecological zones in the country, can be grouped into three major types: (1) transhumant migratory (northern Mountain region), (2) semi-migratory (mid Hills region), and (3) stationary or closed-system intensive farming (Terai and low Hills regions).

Transhumant Migratory System

This type of animal production system is found in the northern mountain region of Nepal (MoAC, 2004). The characteristic of the transhumant production system is a seasonal migratory pattern of movement of animals to the alpine meadows and temperate pastures in summer and to the lower altitude pastoral, forest, and cropped areas in winter (MoAC, 2004).

The livestock raised in this production system are mainly yak/nak, chauri, goat, and sheep. During summers, which typically last from June to September, these animals graze on the alpine pastoral

areas; during winter, they are brought down close to villages and are fed with hays and crop by-products, like straws and chopped fodder root crops mixed with water and salt.

Approximately 65% of the national sheep flock and 35% of the goat population have been raised in this transhumant migratory system (LMP, 1993). Regarding the diversity of the animals raised in this system, yak and chauri are mainly used for transportation (e.g., transporting daily use goods, fire wood) and their milk is used mainly for making cheese and *chhurpi* (a typical Nepalese milk product). Sheep are raised for producing wool, meat, and sheepskin. Similarly, goats are raised for meat, manure, and cashmere wool from *Chhyangra* goats, used to produce the popular, handmade Pashmina shawls.

Stationary with Semi-Migratory or Semi-Intensive
This type of animal production system is common in the Hills region of Nepal (>900 m). In the higher Hills region, the animals are kept in a shed at night and are stall-fed with hay or straw. During bright sunny days, the animals are taken to village pastoral areas and forests for grazing. In the lower and mid Hills region, the animals are kept in sheds at night and are taken out for grazing during the day. The animals raised in this system are Baruwal sheep, Sinhal goats, Khari goats, Pahadi cattle, Chauri, and buffalo (MoAC, 2004). Regarding the purposes of animals reared with this production system, Chauri and buffalo are raised for milk, manure, and meat purposes, while sheep are raised for producing wool, meat, and sheepskin.

Stationary Stall Feeding or Closed-System Intensive
This type of production system is more common in the Terai and lower Hills regions (<900m.) and peri-urban areas where high-yielding milking buffaloes and exotic or crossbred cattle are kept (MoAC, 2004). In most of the urban and suburban areas, the animals are kept in a stall-feeding system and fed with straw and other crop by-products, along with limited amounts of concentrates and green fodders. In road-accessible market areas, the farmers grow cultivated fodder and multipurpose fodder trees in order to provide their animals with balanced nutrition. Dairy farmers and those who raise cattle, buffalo, goats, and poultry often adopt this type of animal production system that contribute to a substantial portion of the production of milk, meat, and eggs in Nepal.

Production of Feeds and Forages
Nepal has different types of feedstuffs in its various agro-ecological zones that are used to support the country's large numbers of livestock and poultry (Table 1). Since the livestock subsector contributes about 14% of the national GDP and 32% of the AGDP, the role of the livestock sector in the country's agrarian economy is immense (MoAD, 2012). However, a shortage of feedstuffs (mainly green fodder, leaves, and green forages during the winter season from October through May); a lack of knowledge on nutrients and anti-nutrient contents of feed; and a lack of scientific knowledge on feed formulation and proper use of feed resources based on the physiological requirements are the major hindrances for the development of the livestock sector in the country (Upreti & Shrestha, 2006).

Table 1. Feed Resources Available in Nepal

Feed Category	Feed Resources
Crop residues	Rice straw, wheat straw, maize stover, pulse residues, oil crop residues, maize cobs, sugarcane tops, and bagasse
Grains and grain by-products	Broken rice, rice bran, wheat, wheat bran, barley, barley, soybean cake, mustard, molasses
Green forage	Fodder crops and pastures
Fodder tree leaves	Forest plants and planted fodder trees

Source: Upreti & Shrestha, 2006.

Feed deficit is the number one limiting factor of reduced production and productivity of livestock in Nepal. Nepalese livestock are undernourished, getting nutrients below their maintenance level. In terms of dry matter (DM) content, there is a 31% shortage of DM to fulfill the requirements of existing livestock and poultry in the country (Upreti & Shrestha, 2006).

In Nepal, there is a huge deficit of concentrates (-66.7%) and green fodders (-54%); however, there is a positive balance of crop residues in the country (+17.6%) (Pande, 1997). This is why Nepalese livestock are mainly fed with crop-residues in all agro-ecological zones of the country. However, these crop-residues are poor in nutrient composition and digestibility, and they cannot meet the livestock nutrient requirements in the country (Upreti, 2004). It will be important to balance the nutrient requirements of livestock by increasing the production of fodder (e.g., green forages, leaves) through implementing programs of year-round fodder and forage production.

In terms of Total Digestible Nutrients (TDN), the country has an overall deficit of 29%, a factor that is aggravated by the huge climate variation in the agro-ecological zones of the country (Upreti & Shrestha, 2006). The Hills region, which has the highest number of livestock in the country, has the availability of only 35.23 % of necessary TDN, whereas the Terai region has 48.07% of necessary TDN and the Mountain region has 16.7% of necessary TDN (APROSC, 1986).

Sources of Feeds and Forages

Cropland

In Nepal, the majority of cropland is found in the Terai (52%) and mid Hills (40%) regions (Shrestha, 2005). These croplands contribute substantial fodder in the areas where livestock are fed with crop residues, like straw, stover, rice bran, wheat bran, barley bran, mustard cake, and molasses. In the country as a whole, crop by-products and residues contribute about 47% of the total available daily livestock nutrition (Upreti & Shrestha, 2006).

Forest

There are about 5.5 million hectares of forest in Nepal (37.4 % of the total land). Forest land is almost evenly distributed between the high Hills (34%), the mid Hills (33%), and the Terai (34%) regions (Shrestha, 2005). Fodder, leaves, shrubs, twigs etc. are collected from the forest for feed and bedding, which is subsequently used as fertilizer. Uneaten branches and twigs are used as fuel.

Shrubland

Shrub land consists of about 0.7 million hectares (4.8 % of the total land) (Shrestha, 2005). The mid Hills region has the most shrub land (57%), followed by the high Hills (39%) and Terai (9%) regions (Shrestha, 2005). Fodder from shrubland is used to feed the animals and for bedding. In the country as a whole, shrubland contributes about 7% of the available TDN (Pariyar, 1998).

Noncultivated Inclusions

There are 0.99 million hectares of non-cultivated inclusions (6.8% of the total land area) (Shrestha, 2005). The mid Hills have the most noncultivated inclusions (NCIs) (67%), followed by the Terai (18%) and the high Hills (15%) regions (Shrestha, 2005). Noncultivated inclusions lie fallow throughout the year, and fodder is collected either by cut-and-carry or grazed by animals of nearby households (Shrestha, 2005).

Grasslands

The area of grasslands is 1.7 million hectares (11.8% of Nepal's land area). Most of the grasslands are in the high Hills (79.3%) and the mid Hills (16.7%) regions. In these high elevations, grasslands are the main source of fodder. The Terai and Sivalik Hills together have 4% grasslands and contribute 5% of available TDN (Pariyar, 1998).

3. Marketing and Exports

Dairy products

Marketing System

Within the livestock sector in Nepal, the dairy subsector is the most important one in terms of its contribution to AGDP. The dairy subsector contributes more than 60% of the livestock sector of AGDP (MoAD, 2012). At present, the total milk production in the country is about 1,734 thousand Metric Tons (MT), of which milking buffaloes contribute about 70% and dairy cattle about 30% (MoAD, 2014). In Nepal, only 13% of the total cattle (1.02 million) and 26% of the total buffaloes (1.34 million) are milking (MoAD, 2012). The dairy sector in Nepal is predominantly through the smallholder production system. About 150,000 dairy farm families are affiliated with 1,500 primary dairy cooperatives throughout the country (MoAD, 2012).

Market Structure

In Nepal, the market system for milk and milk products is divided into two segments: rural or informal, and urban or formal.

- **Rural or informal dairy marketing** – The rural or informal component of milk flow comprises more than 90% of the milk marketing structure in the country (FAO, 2010a). In this milk marketing structure, most of the households with dairy cattle use the milk produced for their own household consumption. Only a little portion of milk is used for informal trading with another individual farmers or contractors or middlemen, who later sell the milk to other individual households, sweetshops, teashops, and other similar places.
- **Urban or formal dairy marketing** – Though this scheme represents a small portion of the milk marketing in the country, it involves several stakeholders in the flow of milk from farmers to consumers. In this formal trading scheme, milk travels from farmers through collection centers to supported outlets and finally to the consumer. Major actors in this marketing chain are listed below.

Key Actors in the Milk Marketing System

Various actors are involved in the flow of milk from "grass to glass." The key actors in the formal milk marketing system include dairy farmers, milk producer cooperatives (MPCs), milk collection centers (MCCs), milk processing plants, and their distribution outlets (FAO, 2010a). The milk producers organize themselves into MPCs. In MPCs, milk is received from individual farmers, milk quality is checked based on fat percentage, and price is determined. After milk is received in MPCs, it is transferred to MCCs that have chilling facilities. From the milk collection centers, milk is delivered to the private dairies or the Dairy Development Corporation (DDC) where milk is processed and sold in the market.

Market Information

Recently, MPCs have emerged as a major actor in passing on market information about pricing of milk and feed supplements, and organizing animal health camp for the benefit of member producers. However, the information passed from MPCs is limited to its members only. In Nepal, the GoN DDC fixes the price of milk and milk products and makes information available to the dairy farmers and the general public through mass media (radio, TV, newspapers, etc.) (DDC, 2016).

Role of Government

In Nepal, dairy development activities are controlled and guided by the Ministry of Agriculture and Development (MoAD, 2014). The GoN established a national Dairy Development Board (NDDB) in 1992 as the apex level autonomous institution for dairy development in Nepal (FAO, 2010a). The board formulates national level dairy development plans and policies for the development of the dairy sector. The Department of Livestock Services (DLS) under the Ministry of Livestock and Poultry Development is another government institution responsible for dairy development in Nepal. DLS is the implementing organization of the Community Livestock Development Project (CLDP), which has programs related to dairy development in Nepal. The CLDP promotes veterinary services in the rural areas through capacity building of paraprofessional veterinarians in artificial insemination (AI) of

dairy animals. The Department of Food Technology and Quality Control (DFTQC) is the government agency responsible for maintaining the safety and quality of milk and milk products, and thereby protecting consumers' health. The DFTQC also promotes entrepreneurship among dairy cattle farmers by developing and disseminating appropriate technologies to the farmers. The Department of Cooperatives under the Ministry of Cooperatives and Poverty Alleviation registers and monitors the MPCs and the district and central level dairy cooperative associations, and provides necessary recommendations and guidance for development of the dairy sector in Nepal.

Major Markets

The major markets for dairy and dairy products in Nepal are urban areas within the country where the annual per capita consumption of milk is 38 liters, as compared to 26 liters in rural areas (FAO, 2010a). Milk is an important commodity making a significant contribution in cash flow from urban consumers to rural milk producers (Economic Survey, 2014). Nepal's per capita consumption of milk is estimated at 139g/day, which is much lower than the world average of 285g/day (FAO, 2010a).

Nepal has a huge deficit of dairy and dairy products during the lean winter season. In 2014, Nepal imported dairy products from India and abroad worth US$4.97 million (Economic survey, 2014). However, during the flush summer season Nepal exports milk to India. For example, in 2015 Nepal exported 30,000 liters of mostly whole milk to India for three months during the flush season (Kathmandu Post, 2015).

Key Bottlenecks

The key bottlenecks in the development and expansion of the dairy sector in Nepal are the low productivity of dairy cattle, inaccessibility of markets, unscientific pricing policies, and lack of product diversification (FAO, 2010a).

- **Low productivity of dairy cattle** – Low productivity of dairy cattle is the number one limiting factor in the development and expansion of Nepal's dairy sector. In Nepal, only 12% of the cattle are crossbred and the remainder is made up of low-producing local breeds. Genetic inferiority of local breeds for milk production is hindering the development of the dairy sector in Nepal. There is a need to crossbreed these local animals with improved stock for increasing milk production (NARC, 2016).

  The shortage of feed and fodder is another critical factor in the low productivity of Nepal's dairy cattle, and the problem is more severe during the lean winter season. Therefore, the government should launch intensive programs for year-round fodder development to meet the nutritional needs of the dairy animals. Fodder-based milk production will also decrease the cost of milk production.

  Poor animal health is a third factor in the low productivity of dairy cattle. At present, the capacity of DLS is inadequate to provide health services to the country's vast livestock population. There is an urgent need to extend dairy animal health services to the village level through veterinary training and capacity building of veterinarians, paraprofessional veterinarians, and village-level animal health workers (MoLD, 2016).
- **Inaccessibility of markets and lack of transport** – At present, the formal milk marketing scheme covers only 10% of the milk produced in the country (FAO, 2010a). Most of the milk collection networks are in the catchment areas of Kathmandu valley, where large private and government dairies are concentrated. To bring the large amount of milk produced in the country into the formal market, there is a need to expand milk collection networks throughout the country. This will not only enable the collection of more milk, but also helps in the expansion of the dairy industry in Nepal by encouraging people toward dairy farming.

  Lack of transportation is another limiting factor for the development of the dairy sector in Nepal. Most of the dairy production in the rural Hills and Mountains regions is not connected by road networks, and the problem is more severe in the rainy season when landslides block

roads. There is a need to build good road networks in rural areas. In a study conducted by NDDB, every one kilometer of additional road length has the potential to connect about 30 farmers to the formal milk marketing system with an average supply of 3.4 liters/day/farmer (FAO, 2010a).

- **Pricing policies** – Current pricing policy limits development of the dairy industry in Nepal (FAO, 2010a). In Nepal, raw milk pricing is based only on fat and solids-not-fat (SNF) content, so there is a chance of adulteration of milk. DDC is the major player determining the price of milk and milk products throughout the country. It determines the price based on its ability to utilize raw milk from farmers. As a result, farmers may get a price below the cost of production.
- **Other factors** – A shortage of adequate market information, inadequate number of chilling centers, poor quality raw milk, adulteration of milk and milk products, and frequent power outages are other factors negatively affecting the milk market (FAO, 2010a).

Meat and live animals

Livestock is closely associated with Nepalese livelihood and is the main source of income for rural families in Nepal. According to the DLS, 87% of the Nepalese population keeps some form of livestock at home. Meat and live animals are the important components of the livestock sector contributing 32.4% to the AGDP and 4% to national exports (CLDP, 2008).

Marketing System

The marketing system for meat and live animals in Nepal is predominantly an informal marketing system with only small portion of formal marketing (FAO, 2010b). In Nepal, the marketing system varies as per livestock species. In the case of goat, the marketing system practiced is an informal one where local collectors visit farm to farm, bring goats to the local market, and sell them directly to the consumers or to the local butchers who later sell freshly prepared meat to the consumers. In Nepal, fresh meat is preferred over frozen meat.

Key Actors in Meat Marketing

Since marketing for meat in Nepal is predominantly informal, the actors in live animal markets are livestock farmers, village traders (collectors), middle men, and butchers/retailers (FAO,2010b).

Market Information

The DLS' Directorate of Livestock Marketing and Promotion is a government agency involved in the overall management of the livestock market in the country. It formulates plans and policies to connect rural livestock farmers with the market by providing them support in production, supply, transportation, processing, and storage of livestock products (MoLD, 2016). DFTQC is the government agency responsible for checking quality in meat to protect consumer welfare; however, DFTQC is understaffed and under budgeted, causing inadequate monitoring of meat markets. Unlike milk cooperatives, livestock cooperatives have not flourished in the country and therefore livestock farmers commonly sell their animals alone. In Nepal, highest livestock demand occurs just before the annual Dashain festival. Local traders who collect livestock from farmers determine the farm gate price, while butchers' associations will determine the price in the retail meat markets based on demand and supply.

Major Markets

In Nepal, major markets for livestock are big urban cities with large, dense population, like Kathmandu and Pokhara. Since people prefer fresh over frozen meat, most people buy freshly prepared meat from butcher shops. In the case of buffaloes and pigs, animal slaughter takes place on riverbanks, street sides, open pastureland, or courtyards. There are a few slaughterhouses constructed by the GoN in big cities like Kathmandu and Hetauda; however, they are not fully functional. In the case of poultry, slaughtering facilities are better than for other livestock. Poultry are slaughtered in modern slaughterhouses with the facilities for freezing. There is one semi-automated slaughterhouse in in Kathmandu valley for poultry.

Key Bottlenecks

- **Long market chain** – In Nepal, the livestock marketing chain consists of local markets, catchment/terminal markets, district markets, and bigger end terminal markets. In local markets, livestock producers themselves sell their livestock within the village for consumption or breeding purposes. Livestock producers usually sell one or two animals at a time. Middlemen and collectors visit farms, negotiate with the farmers, buy livestock in bulk, and bring the livestock for sales to the catchment areas. Wholesalers will purchase livestock in bulk from the catchment markets to supply them to the main marketing centers in big cities like Kathmandu and Pokhara. This long marketing chain affects both the livestock farmers and the end consumers, as livestock producers are getting a lower price for their livestock and consumers are paying a higher price, while the middle men enjoy a huge share of the profit. This poor return discourages farmers from rearing livestock.
- **Lack of market infrastructure** – In Nepal, there is a lack of proper market infrastructure for live animal marketing. The marketing center lacks the basic minimal facilities and facilities are almost non-existent in rural markets. Due to the lack of marketing centers, there is no communication between the farmers and marketing agents related to price, demand, and availability of livestock. As a result, livestock producers often do not know the optimum price of their livestock causing them to receive a lower price. This also deters producers from the livestock business.
- **No minimum support price for livestock producers** – There is no mechanism for a minimum support price for livestock producers. Since there are no public livestock marketing centers in many rural areas, the farmers have no option but to sell their livestock when collectors come to visit the farms. Famers and collectors can bargain, but due to the need for money and lack of information available about market prices, many livestock farmers accept the price given by the collectors. As a result, farmers cannot realize the optimum return from their investments, which is a hindrance for the development of the livestock sector in the country.

Lack of certification of slaughter – There is no provision for slaughter certificates to verify healthy animals fit for consumption, and, with lack of proper monitoring, many sick animals enter the slaughterhouse. Though the GoN has enacted the Slaughterhouse and Meat Inspection Act of 1999, its implementation on the ground is limited.

4. Consumption Patterns

Dairy products

The average annual per capita consumption of milk in Nepal is 64 liters, which is lower than the FAO recommendation of 92 liters (MoLD, 2016). Even at this low level of consumption, there is a huge deficit of milk in Nepal. Compared to the daily demand of 8.2 million liters, the dairy supply is just 4.26 million liters. This demand-supply gap in milk is reflected by the huge seasonal variability in the importation and exportation of milk products. Nepal imports NPR1 billion (Nepalese rupees), or US $9.3 billion, worth of milk products and exports NPR13 million worth of milk products annually (MoAD, 2012).

People previously preferred only whole raw milk; however, after the advent of DDC and private dairies, there has been a gradual change in people's food habits with the increasing supply of pasteurized milk and modern dairy products such as cheese, butter, and ice cream (Kathmandu Post, 2015). Pasteurized milk is the prominent product of the dairy industry, as almost 80 % of milk collection in the country's formal sector is used to produce processed milk (FAO, 2010a). Due to the advent of many commercial dairies, various brands of the locally produced and imported modern and traditional milk products are available in urban markets of Kathmandu valley. The major milk products available in the markets are imported Skim Milk Powder (SMP), Full Cream Milk or Whole Milk Powder (WMP), infant milk formula, diary whitener, cheese, butter, sweetened condensed milk, ice cream, and ghee; and locally produced cheese, butter, ghee, ice cream, paneer, and yoghurt. Milk

is highly valued in Nepalese culture as a complete food, which is why demand for cheese, butter, ghee, and ice cream must be fulfilled by both local and imported products.

Meat

From 1991 to 2009, the overall trend of meat production showed an average annual growth rate of 2.79%, which is slightly higher than the growth rate of the population of 2.25% per year (FAO, 2010). The highest share in total meat production is from buffaloes (64 %), followed by goats and sheep (21%), pigs (7%), and poultry (8 %) (MoAD, 2012).

The average per capita consumption of meat in Nepal is 11.15 kg/year, which is lower than the global average of 42.5 kg/year. (FAO, 2010b). Buffalo meat is preferred the most by Nepalese, followed by goat, chicken, and pork. As buffalo meat is typically cheaper and its production was estimated at 173.12 million kg in 2015. This meat is widely used for preparing *momo* (meat dumplings), a highly beloved food. There are estimated to be 5.14 million live buffaloes in the country with the price of buffalo meat being even cheaper (60%) than mutton.

Mutton is the second most sought after meat accounting for 20% of the country's meat demand. Production of mutton has been projected to grow from 6.25% to 59.05 million kg for fiscal year 2015/2016. (MoAD, 2012). The average price of mutton stands at NPR700 per kg, and the ministry estimates that there are 10.17 million live goats in the country, with an annual growth rate of 4.02% (MoAD, 2012).

Pork accounts for 7% of the meat demand and recently had an annual growth rate of 6.15% (MoAD, 2012). The country has roughly 1.22 million live pigs, mainly found in the eastern region (MoAD, 2012).

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