

## Negative Supply of Quality Fodder- A Threat for Competitive Dairy Market Growth: A Critical Assessment

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### Abstract

A systematic desk review and sustainable way forward to cope with the negative feed supply has been done. The assessment reveals the overall demand of feeds is 30.2 m mt DM (straw- 36%, green- 53% and concentrate 11%). On the other hand, the supply is negative. Total feed supply is only 18.3 m mt DM (straws- 11.7 m mt DM (64%), green fodder- 5.3 m mt DM (29%) and concentrated feed- 1.2 m mt DM (7%). In this way, overall deficit of DM is estimated to be -11,864,469 mt DM (39%). The supply of crop residues (paddy/wheat straw) exceeds the demand by 7.5%, but the deficit of green fodder is -66.5% and the grain by-products is over -62.6% in general; is a serious issue. Significant deficit of green fodder and grain by-products seriously affects on health conditions and productivity (milk/meat as well as reproductive performance). Such a negative supply of feed and fodder has compelled the commercialized dairy producers to look for easily available ration i.e. straw and grain by- products. But such conventional feeding practices have resulted into higher feeding cost. For example, Rs 30.1/lit compared to forage based feeding of Rs 13.4/lit. Based on this assumption about 125,000 ha to support dairy producers either agricultural or community land under intensive fodder cultivation is needed. For this, the government and potential international organizations should come forward to address such a crisis for the sustainability and competitive dairy market growth.

**Keywords:** *Livestock Production; Feed Demand; Free Supply; Balance Situation*

### Introduction

Since the interventions of government as well as international organizations in overall livestock development, a significant achievement has been made in commercialized livestock production. However, competitive and sustainable production mainly due to short supply of quality fodder and higher production cost still remained a challenge to be resolved. As a ruminant, the dairy animals should be fed with high quality green fodder to meet the nutritional requirements for physical maintenance and production. But, majority of commercial dairy producers rely on straw supplemented with higher doses of grain by-products as a major source of dairy ration; which neither healthier nor cost efficient to the animals. In such a situation, analysis of feeds and fodder supply for overall competitive market growth of dairy sectors and for the strategy/programme preparation is important. In this regard, a systematic desk review on status of livestock feeds and fodder balance has been done; information/data analyzed, synthesized and presented in a suitable form in the line with sustainable and competitive market growth strategies preparation.

### Livestock and feeding behaviour/dry matter intake

### Livestock population

The total livestock MOAD, 2014 Population in the country is 7.3 million cattle, 5.2 million buffalos, 10.2 million goats, 0.8 million sheep, 1.2 million pigs, 0.1 million yak/chauris and 0.1 million equines [1]. On head count basis the total heads is 17.5 million. When the total livestock heads (17.5 million) are converted into a standard Livestock Unit (LU) equivalent to 400 kg body weigh was found 7.8 million heads [1], LRMP [2,3] (Chart 1).

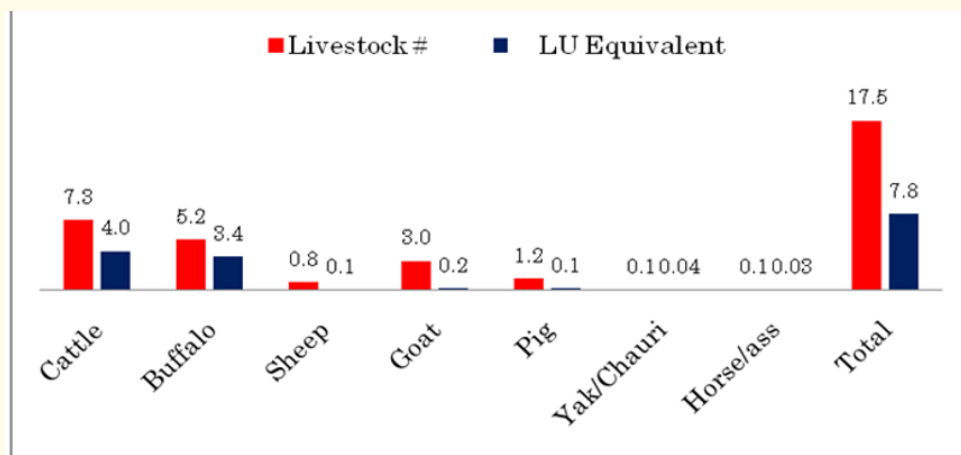


Chart 1: Livestock # VS LU equivalent (400 kg BW), m head.

### Livestock: Feeds and feeding behavior

The domestic livestock are grouped into four categories viz. large ruminants- cattle and buffaloes, small ruminant- goats and sheep, non-ruminant- pigs and equines and alpine animals- Yak/Chauris.

Similarly, the major parts of the livestock ration of these animals are grouped into three categories viz:

- **Straw:** Comprising plant residues of paddy/wheat, millet, maize, pulse crop and others.
- **Green:** Cultivated fodder, native fodder collected from agricultural field and community land, sugarcane top, forest fodder and grazing on fallow/forestlands, and tree fodder foliage.
- **Concentrated:** Formula feed, grain by-products (rice/wheat bran, maize flour, oil- cake and others).

The feeding behavior of these groups of animals as well as Dry matter intake (DMI) also varies with each other. For example; the potential DMI of the large ruminant are 40:50:10 i.e. straw 40%, green 50% and concentrated 10% in case of cattle and buffaloes, in case of goat and sheep the DMI is 0:90:10 i.e. 90% green and 10% concentrated feed. For pigs 10% green and 90% concentrated feed. For yak/ chauri and equines the DMI is 20:70:10 i.e. 20% straw, 70% green and 10% concentrated feed (Chart 2).

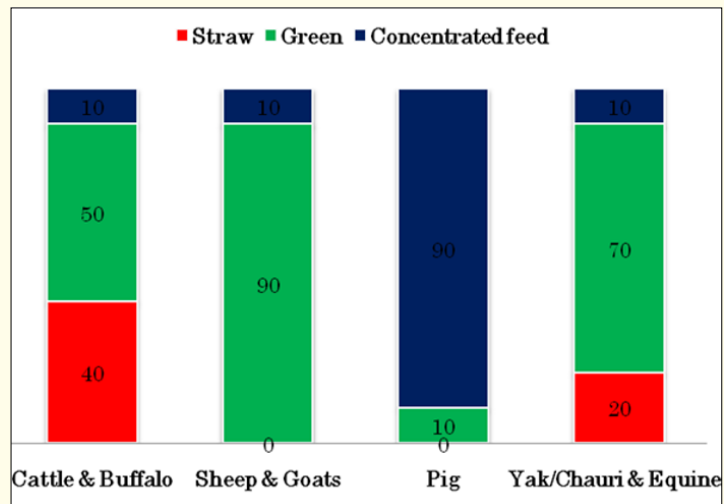


Chart 2: Dry matter intake in ratio.

**Feeds and fodder situations**

**Feeds and fodder demand by livestock**

The estimated fodder demand by livestock is 30,155,840 mt DM in which requirement of straw is 36% (10,880,355 mt DM), green biomass 53% (15,955,820 mt DM) and concentrated feed 11% (331,9664 mt DM) (Chart 3).

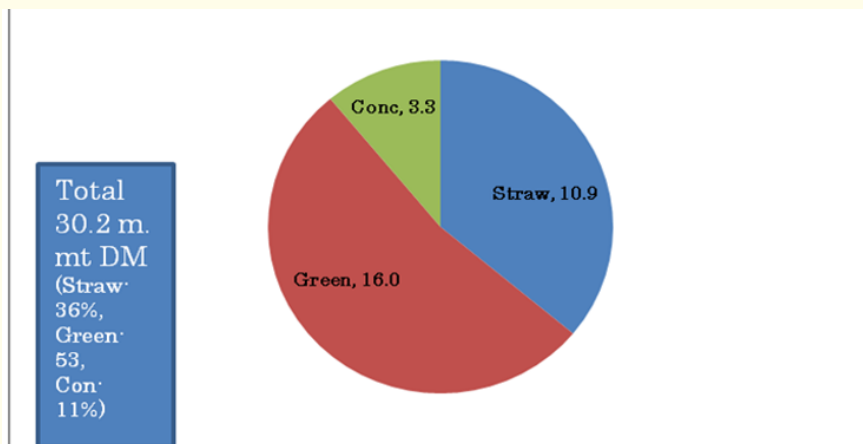


Chart 3: Feed Demand by types, m mt DM.

In terms of animal species, cattle requires 14,549,597 mt DM, buffalos 12,531,982 mt DM, goats 2,252,097 mt DM, and rest about 3% of feeds is required by sheep (203,445 mt DM), pigs (380,100 mt DM), Yak/Chauri (128,823 mt DM) and horses 109,795 mt DM.

Out of total potential requirement of feeds and fodder 30,155,840 mt DM; the requirements of straw is 36.1% (10,880,355 mt DM), green fodder 52.9% (15,955,820 mt DM) and concentrated feed is just 11% (3,319,664 mt DM) (Adapted from MOAD [1], LRMP [2], MPFS [4] and others).

Based on the physiographic regions the requirements of feeds and fodder reveals that highest amount of feeds is required by Middle mountains 40% (12,051,706 mt DM), followed by Terai 33% (9,949,200 mt DM) and Siwaliks 12.3% (3,722,511 mt DM); and 11.7 % (3,532,022 mt DM) in High mountains and only 3% (900,401 mt DM) in Himal regions (Adapted from MOAD [1], LRMP [2], MPFS [4] and others) (Chart 4).

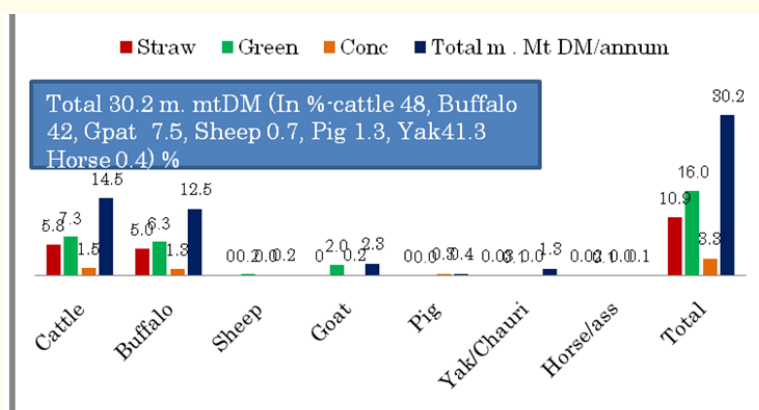


Chart 4: Feed demand by LU, m. mtDM/yr.

Supply of feeds and fodder

The major sources of feeds and fodder are i) Crop by-products (straw/stover, grain by-products), ii) agricultural field fodder (collection of native grasses and weeds, fallow cropland grazing and cultivated fodder crops), iii) forest and shrub land foliage (under growth herbaceous plants; tree foliage), iv) rangeland/grassland fodder, v) tree fodder, and vi) concentrated formula feed (Chart 5).

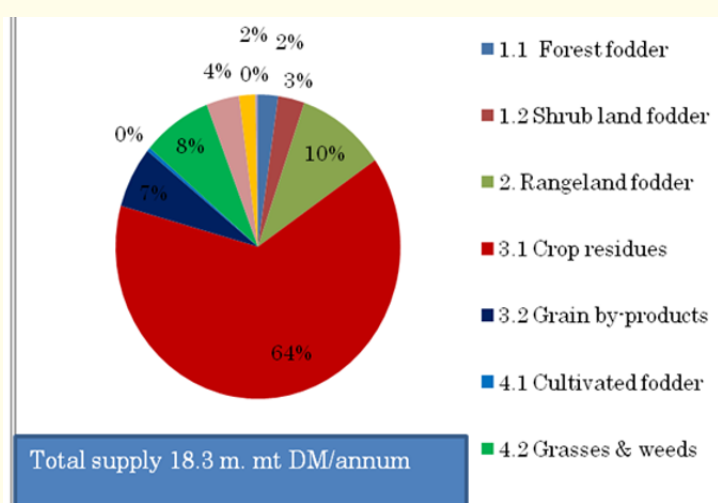


Chart 5: Sources of feeds and fodder and supply %.

Total feed supply from major sources is 18,291,371 mt DM/annum, in which the total production of straws is 64% (11,701,397 mt DM), green fodder 29% (5,346,952 mt DM/annum) and concentrated feed 7% (1,243,022 mt DM/annum) in the country (Adapted from MOAD [1], LRMP [2], MPFS [4], Pande [5] and others [6-11]).

Out of total, the Terai region supplies 7,087,642 mt DM feeds and fodder, Siwaliks 2,131,822 mt DM, Middle mountains 6,228,525 mt DM, High Mountains 2,037,931 mt DM and Himal region supply only 805,450 mt DM in total feeds and fodder (Chart 6 and Table 1).

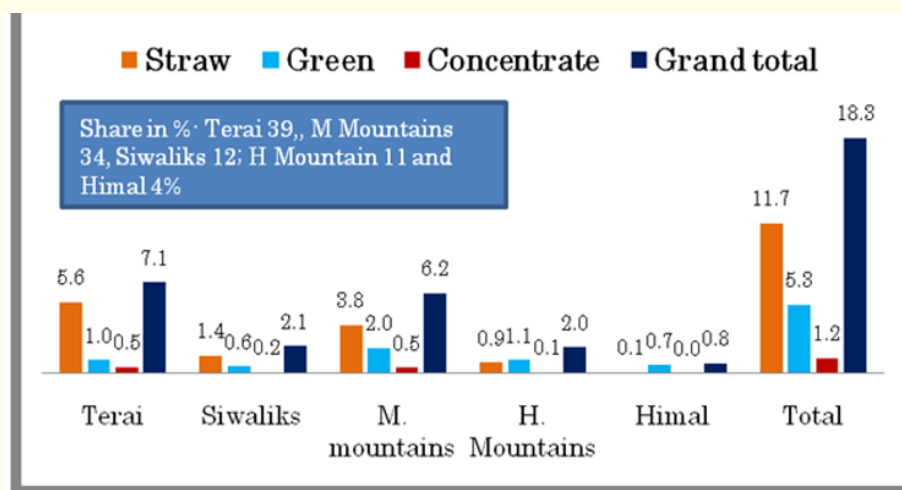


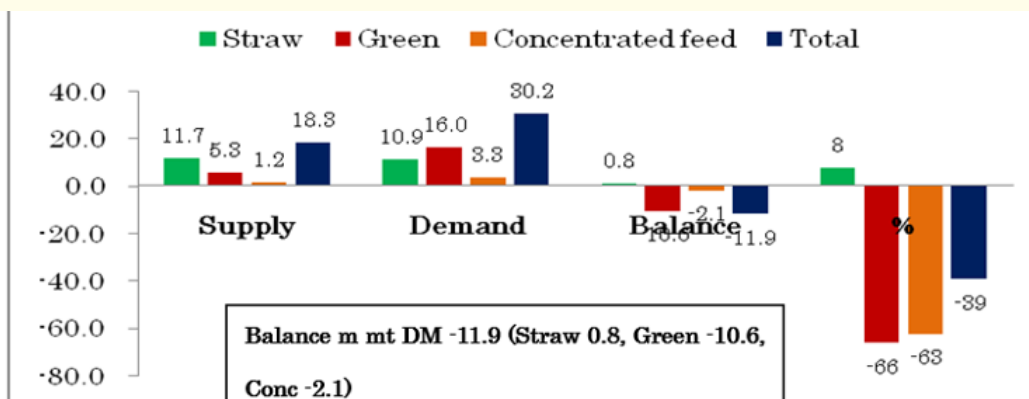
Chart 6: Feeds and Fodder Supply by Region, m. mt DM.

SN	Sources	Straw	Green	Grain by-products	Total, mt DM
1	Forests				
1.1	Forest fodder	-	416196	-	416196
1.2	Shrubs fodder	-	549774	-	549774
2	Rangeland fodder	-	1846255	-	1846255
3	Crop by- products				
3.1	Crop residues	11701397	-	-	11701397
3.2	Grain by-products	-	-	1189098	1189098
4	Agricultural fields				
4.1	Cultivated fodder	-	73750	-	73750
4.2	Grasses and weeds	-	1443800	-	1443800
4.3	Fallow land grazing	-	681795	-	681795
4.4	Tree fodder	-	335382	-	335382
5	Formula feed	-	-	53923	53923
	Total, mt DM	11701397	5346952	1243022	18291370

Table 1: Feed supply from different sources, Nepal (mt DM/annum).

**Balance situation of feeds and fodder**

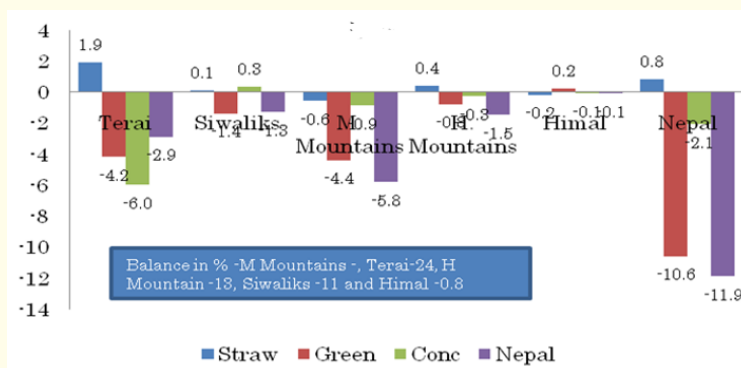
Overall deficit of DM is estimated to be 39.3 percent (-11,864,469 mt DM). The supply of plant residues mainly the paddy/wheat straw exceeds the demand by 7.5% (821,082 mt DM) in general. The overall deficit of green fodder is 66.5% (-10,608,869 mt DM) and the deficit of grain by-products/concentrated ration is over 62.6% (-2,076,643 mt DM) (Chart 7).



**Chart 7:** Balance situation of feeds and fodder, m mt DM.

Significant deficit in terms of green fodder and grain by-products seriously affects the performances in terms of animal health conditions and productivity (milk and meat) as well as reproductive performance. As the deficit of green forage and grain by-products are relatively higher than other feedstuff, it is anticipated that the deficit of required nutrition in terms of CP, energy and TDN could much more than the DM.

Similarly, in terms of the physiographic regions, highest deficit of overall feeds and fodder was found in Middle mountain which is about 48.3% (-5,823,182 mt DM), followed by Siwaliks 42.7% (-1,590,689 mt DM) and High mountains 42.3 (-1,494,091 mt DM) respectively. The deficit of feeds and fodder was observed in Terai 28.8% (-2,861,558 mt DM) and Himal region by 10.5% (-94, 951) respectively (Chart 8).



**Chart 8:** Feed Balance by region, m. mt DM.

In terms of fodder type, straw is in surplus supply by 7.5% (821,042 mt DM); By physiographic regions, the straw is surplus by 51.7% (1,891,852 mt DM) in Terai and also in Siwaliks by 4.7% (62,739 mt DM), but deficit in rest of the regions. Such a deficit is directly associated with the production pattern of the major crops in the respective regions.

Similarly, the green fodder is deficit by 66.5% (-10,608,870 mt DM); except the Himal region where the supply exceeds by 28.4% (150,116 mt DM). The surplus of the green fodder in Himal region may be associated with the abundance of alpine pasturelands. The deficit of concentrated feed is also 62.6 (-2076,643) mt DM) in general (Chart 9).

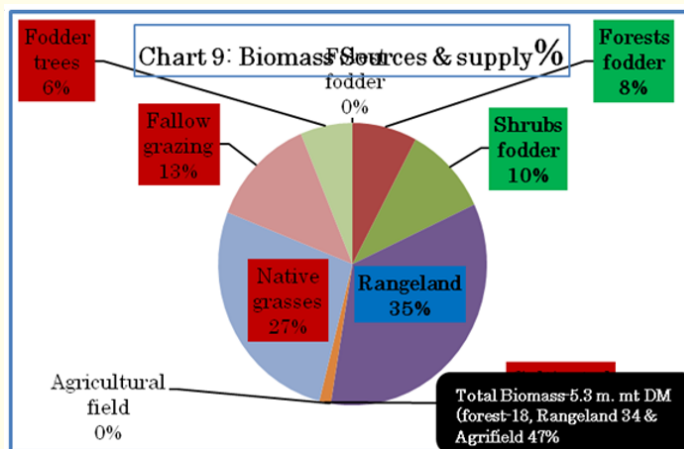


Chart 9: Biomass sources and supply %.

### Analysis of green fodder balance situations

#### Major sources of green fodder

Fodder cultivation is a new intervention in the country. Most of the green fodder for livestock is derived from the three major sources, such as:

1. Agricultural Field:
  - Cultivate fodder,
  - Native grasses and weeds collected under cut and carry,
  - Fallow crop grazing
2. Grasslands/rangelands,
3. Forest and shrublands.
4. Fodder Trees (Chart 10).

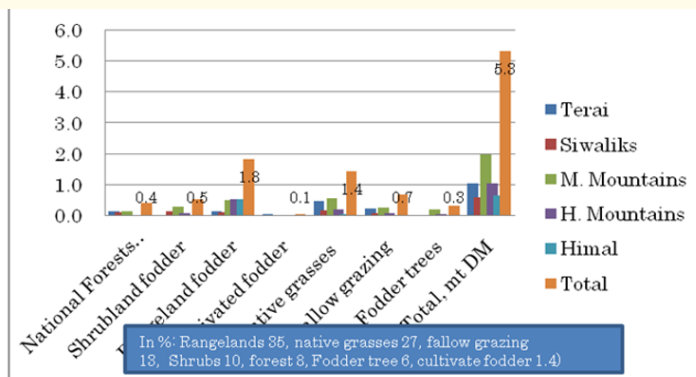


Chart 10: Biomass supply by region, m. mt DM.

### Supply of green biomass

The total green biomass supplied from the above sources is estimated to be 5.3 m mt DM. In which contribution of the agricultural field is 47% percent, grassland 34 and forest fodder 18% respectively. Based on the physiographic regions Middle mountains contributes 37% (Chart 11).

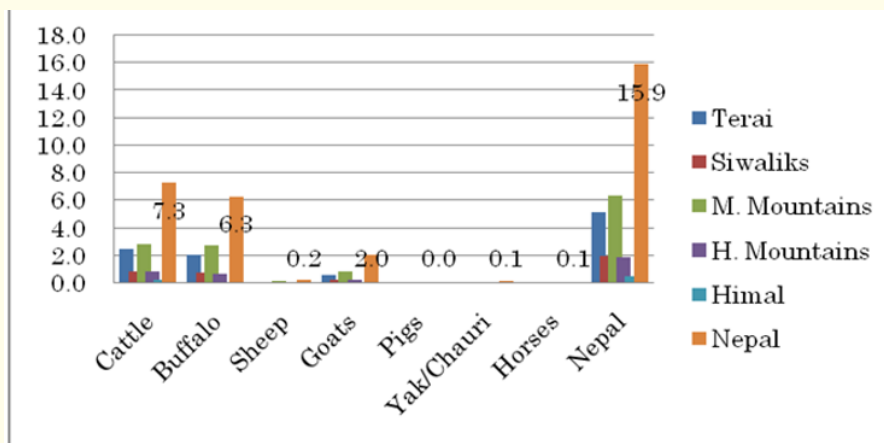


Chart 11: Green fodder Demand by Region m.mt DM.

### Demand of green biomass

The demand of green biomass for the livestock is estimated to be 15.9 m mt DM. In which demands by cattle is 46%, buffaloes by 39%, goats 13% and rest about, 3% are sheep, yak/chaury, equines and pigs (Chart 12).



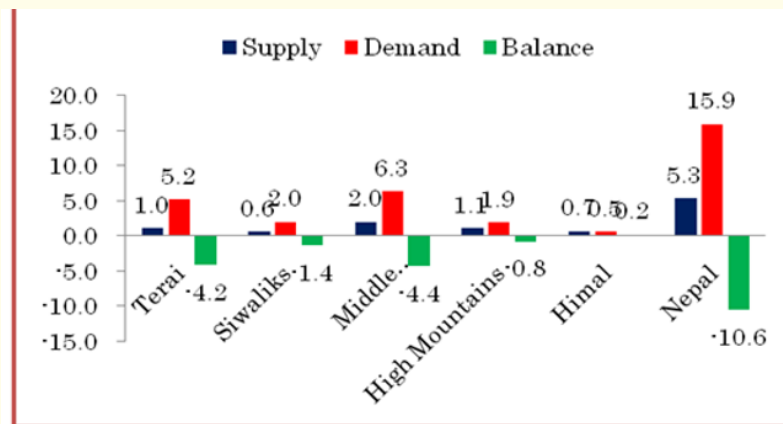


Chart 12: Balance Situation of green Biomass, m. mt DM/annum.

**Balance situations of the green biomass**

The balance situation is not encouraging, as the demand is 15.9 m mt DM and the total supply is just 5.3 m mt DM, reveals the negativity. Which reflects a total deficit of the green biomass in overall is 66 % (-10.6 m. mt DM). Out of the total biomass deficits, the Middle mountains shares 40%, Terai 37%, Siwaliks 12.4%, High Mountains 11.9% and Himal 3.3% (Chart 13).

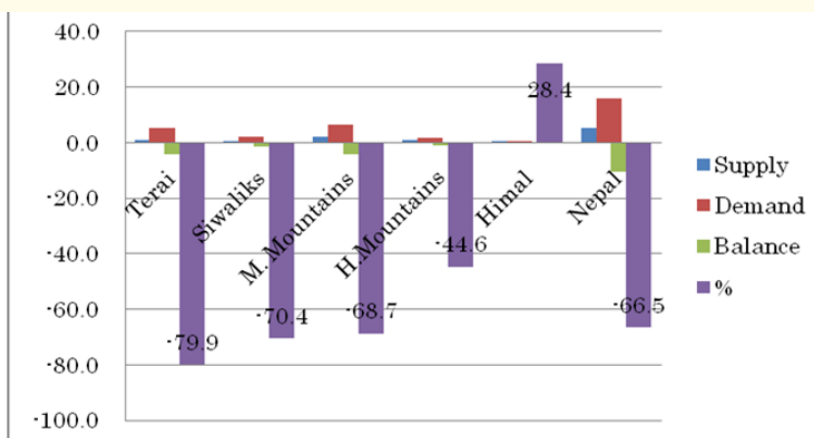


Chart 13: Green fodder balance in %.

**Negative impact on livestock production**

Consequences of feeds and fodder deficit resulted in negativity in dairy production by following ways:

- **High cost of production:** Use high dose of roughages supplemented with grain by-products to the dairy cattle results in higher cost of production, with poor health conditions.

- **Over utilization of feeds and fodder resources:** Over exploitation especially of existing community resources by grazing/ browsing livestock and community people have lead degradation and deterioration.
- **Performance of unproductive/dry animals:** Under the scares feed supply situations most of the unproductive/dry animal suffers more. Feeding low quality roughages especially to dry and unproductive livestock affects more in their health and performances.
- **Disposal of unproductive/dry animals:** To save the feed cost mostly the dry/unproductive animals are disposed whenever possible. For example: disposal of dry buffalo for slaughtering, which is creating a vacuum of elite dairy genetic materials.
- **Others:** Like chasing off the unproductive animals from the farm to stray etc.

### Strategies adopted to cope with green biomass deficits

Both livestock and dairy entrepreneurs practice some strategies to cope with deficit supply of feeds and fodder such as:

- Feeding roughages especially to dry and unproductive livestock,
- Use high dose of roughages supplemented with grain by-products,
- Disposal of animals,
- Over exploitation of available feed resources.

### Consequences of negative feed balance of in dairy production

In the absence of quality fodder, most of the commercial dairy producers rely on straw based feeding systems supplemented with higher amount of concentrated ration/grain by-products. These conventional practices are neither cost effective nor healthier to the respective dairy cattle and dairy entrepreneurs.

On an average, the cost of the raw milk production ranges 30 - 40 Rs/liters in major milk production grid in Nepal. In a recent events on forage based dairy workshop organized by Forage Resource Centre, Kavre; Mr. Narayan Badal, Chairperson of Kavre Milk Producers Cooperatives reported that the cost of production was found Rs 41/liters of raw milk in Kavre for a cow giving on an average 10 liters of milk/day (Narayan Badal, Chairperson Kavre Dairy Milk Producers Cooperatives, 28 June 2016). In similar events organized at Chitwan, Makawanpur, Morang, Dang, Bardiya and other sites of milk grids, the participating representatives of the milk producers associations unanimously raised the voices of increasing feed cost in milk production. On the other hand, Central Dairy Cooperative Association Nepal (CDCAN) argues that the price of raw milk could not be raised as it has already attained the saturation level. In such as situations, the dairy production enterprises may not be sustainable and the entrepreneurs will look for other options for investments.

### Way forward/need for forage based dairy production

#### Comparative cost advantages of conventional vs forage based feeding

After a reghirous consultation with the key dairy producers as well as relevant experts the comparative cost calculation has been done. Under conventional practices of dairy production, a typical elite dairy cattle (cross bred Jersey and/or Holstein) weighing about 400 kg live weight and yielding 3,000 liters/milk/year (about 10 liters/day for 300 days lactation period); and consumes 10 kg DM during 24 hours period. The total fodder equivalent to 13 kg on fresh weight basis (6 kg straw, 1 kg green and 6 kg grain by-products); (equivalent to 10 kg DM) is offered by the common dairy producer. Assuming the price of straw Rs 15/kg, fodder Rs 1/kg and grain by-products Rs 35 kg; the average cost of ration will be Rs 301/day i.e. Rs 30.1/liter of milk (except other costs like health, breeding, labour, interest on investment and others). Moreover, the conventional feeding meets the DM requirement but lacking in CP supply which is estimated < 100 gm/day.

On the other hand, if fodder based feeding practices adopted to the same cattle one need to offer 2 kg straw, 34 kg green, 2 kg concentrated feed (equivalent to 10 kg DM) which supply as well more than 140 gm CP/day. Such a ration would cost about Rs 134/day i.e. Rs 13.4/liter of milk. In this way, one can save about Rs 50,100/cow/year just by shifting from conventional practices to fodder based feeding approaches (Chart 14).

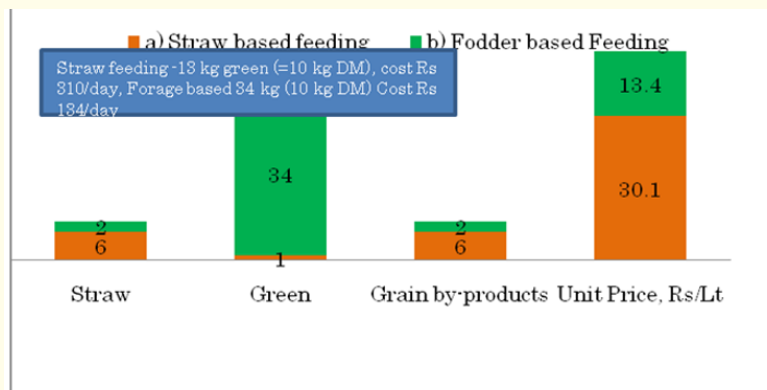


Chart 14: Straw VS fodder based feeding (Dairy cow 400 kg BW, DMI 2.5 = 10 kg DM/day, mild yield 10 lt./day).

### Expansion of forage cultivation for quality fodder supply

For the promotion of forage based feeding practices to the half million members associated with CDCAN, with about two hundred thousands elite dairy herds will need at least one hundred twenty five thousands of land under intensive fodder cultivation. The land could be agricultural private and/or community land, with a popular combination of forage crops like oat+vetch/berseem; teosinte+ cow pea; napier/seteria+ desmodium/forage peanut or other combination) would yield quality fodder @ 16 mt DM/ha equivalent to 2 million mt DM quality fodder. Either through government and/or international organization’s facilitations (Table 2).

SN	Description	Unit	Total
1	HH in dairy production	Million	0.5
2	Total elite animals (@ 2 cows/buffaloes/hh)	Million	1
3	Green Fodder required @ 2 mt DM/animals+	m mt DM/yr	2
4	Average forage prod mt DM/ha	mt DM/ha	16
5	Total area required	ha	125,000

Table 2: Area required for fodder production.

### Conclusion

Based on the surging price of feed cost, the present feeding practices needs to transform into forage based dairy production. Otherwise the dairy entrepreneurs could not sustain in the market and look for the alternatives of dairy business; with the floods of cheap and low quality dairy products from neighbouring countries. So, it is high time to strengthen the forage cultivation in the agricultural as well as community land to supply as alternatives of straw and concentrated feed. The government as well as international organizations should come forward to address this crisis for the sustainability and competitive dairy market growth.

### Bibliography

1. MOAD. Statistical Information on Nepalese Agriculture 2013/14 (2070/71), GoN, MOAD, Agri-Businee Promotion and Statistical Division, Agri Statistics Section, Singh Durbar, Kathmandu (2014).
2. LRMP. Land Resource Mapping Project, 1986. HMG/ Nepal (1986).
3. ASD. Statistical Information on Nepalese Agriculture. Agriculture Statistical Division, Ministry of Agriculture, HMGN, Kathmandu, Nepal (1996).
4. MPFS. Master Plan Forestry Sector, Government of Nepal, Ministry of Forestry and Soil Water Conservation, Nepal and ADB/FINNIDA (1988).
5. Pande RS. Fodder and Pasture Development in Nepal. Udaya Research and Development Services Pvt. Ltd, Sanepa, Nepal (1997).
6. CDCAN. Central Dairy Cooperative Association Ltd Nepal (CDCAN) (2016).
7. DDC. Annual Progress report (2069-2070) (in Nepali). Dairy Development Corporation, Kathmandu, Nepal (2014).
8. MFSC. Master Plan for the Forestry Sector Nepal. Ministry of Forests and Soil Conservation, Babarmahal, Kathmandu (1988).
9. MoLD. (2072): Ministry of Livestock Development, Status and Commitment (in Nepali), Government of Nepal, Ministry of Livestock Development, Kathmandu (2015).
10. NARC. Nutrient Contents of Feeds and Fodder in Nepal. (ed C R Upreti, BK Shrestha), Nepal Agricultural Research Council, Kathmandu, Nepal (2006).
11. Rajbhandary HB and Pradhan SL. Livestock Development and Pasture Management. Background Papers to the National Conservation Strategy for Nepal, Volume 1, Nepal National Conservation strategy Implementation Programme, National Planning Commission, HMG Nepal in collaboration with the World Conservation Union (IUCN), Nepal (1991): 259-331.

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