



## Fodder supply from public and private lands in two agro-climatic zones of Himachal Pradesh

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### ABSTRACT

A field study of 200 sample household was conducted in 2 agro-climatic zones of Himachal Pradesh to understand the availability of different fodder from varied sources. The availability of different type of fodder from owned lands increased with increase in farm size, while the quantity of these fodders from public lands decreased with increase in farm size. The productivity of fodder in CPR lands was very low due to plantation of pine trees and growth of *Lantana* and other obnoxious weeds on a large scale. Quantity of green and dry fodder collected by small farmers was higher from owned land as compared to public land. The farm size-wise analysis showed that the marginal farms depends more on public lands as compared to small farms. The grazing of animals on CPR lands was maximum during winter followed by rainy season. During summer, the maximum grazing was on cultivated fields. The average requirement of dry and green fodder for total livestock per household per annum was 73q and 152q, respectively. The green and dry fodder deficit per farm was 39 and 30%, respectively.

**Key words:** Availability, Deficit, Fodder, Livestock

Agriculture has been and still remains the mainstay of Himachal Pradesh a model hill state in the country as far as the overall socio-economic development is concerned. Livestock rearing is also an important component of rural economy where in more than 90% of households keep 2-3 animals. In a farm production system, some resources are shared and managed within a farm unit, while others are contributed by external sources. Public lands (CPRs) are important natural resources in the state and play a key role not only in economy, but also in maintaining ecological balance, besides human beings, the livestock is also heavily dependent on public lands (CPRs) for fodder and grazing. On the other hand due to increasing biotic pressure there is heavy exploitation of public lands. Overgrazing in such lands has caused permanent damage to vegetative cover leading to massive soil erosion and increase in barren land over a period of time in the state (Thakur 1996).

The factors resulting in decline of these resources are — land reforms, development programmes, unlawful encroachments and commercialization of agriculture (Jodha

1985, Iyengar 1988, Karnath 1992). Due to decrease in productivity of public lands and increased population, the pressure on private lands has also increased. These lands play an important role in enhancing income, employment and sustenance of village community by providing multiple goods and services to support farming systems (Vashist and Pathania 1999). Keeping in view the immense importance of these resources towards the economic development of the state, the present investigation was undertaken to analyse the availability of fodder from private and public lands.

### MATERIALS AND METHODS

Two agro-climatic zones, viz. sub-mountain and low hills sub-tropical zone (below 650 m above mean sea level - zone-I) and mid-hills sub-humid zone (650–1500 m above mean sea level - zone-II) of Himachal Pradesh were selected. These two zones account for major cultivable land (about 80%) and harbour around 85% of the total population of human beings as well as livestock (Government of Himachal Pradesh 1970).

The multistage stratified random sampling technique was used in the present study. Hamirpur district from Zone-I and Kangra district from Zone-II were selected. Two blocks were selected from each district. Two *Patwar* circles (Revenue villages) were randomly selected from each selected block. Two villages were selected at random from each *Patwar*

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circle. The selected households were divided into 2 categories, viz. marginal (having land holdings less than 0.76 ha) and small (having land holdings more than 0.76 ha) by using cube root frequency method. In total, 200 sample households belonging to marginal (126) and small (74) categories were selected from all the sample villages through probability proportional allocation method. Both primary and secondary data were collected. The livestock population was converted into standard cattle unit by conversion factor as suggested by Kumbhore *et al.* (1983). The feeding requirement rate used by NCA (Government of India 1976) was used for estimating the total feed and fodder requirement of animal stock. Simple mathematical and statistical methods were used to analyse the data.

## RESULTS AND DISCUSSION

*Fodder availability:* Fodder availability was estimated by considering fodder from public (CPRs) and private (owned) lands and crop by-products obtained from own land. Zone-

wise and overall situation of fodder availability is given in Table 1. The availability of tree fodder, green fodder and dry fodder from own lands were increased with the increase in farm size, while the quantity of these fodder from CPR lands decreased with increase in the size of holdings, indicating dependence of marginal farmers more on CPR lands for fodder as compared to small farmers. The farmers of Zone-I also reported scarcity of fodder as and when the crop production was very low. The farmers had to import wheat-straw from Punjab. The sample households also reported that the productivity of fodder had decreased on CPR lands due to pine-tree-plantation and growth of weeds (i.e. *Lantana camera*). The farmers were in favour of plantation of fodder trees instead of pine trees, to meet their demand of fodder as well as of fuel wood. Similar trend was noticed for different categories of households in Zone-II

*Season wise fodder availability:* Season-wise availability of fodder from different sources is presented in Table 2. In Zone-I the average dry fodder per household available from

Table 1. Fodder availability from different sources on households (q/farm)

Farm size	Tree fodder			Green fodder			Dry fodder			Crop byproduct	
	Own land	Common land	Purchase (₹)	Own land	Common land	Purchase (Rs)	Own land	Common land	Purchase (Rs)	Own land	Purchase (Rs)
<i>Zone-I</i>											
Marginal	11.85	1.55	116.10	32.40	3.45	87	6.96	3.72	851	22.06	180
Small	18.63	1.22	12.20	53.95	2.09	-	15.33	2.95	444	33.30	153
<i>Zone-II</i>											
Marginal	8.83	17.72	32.09	35.32	42.98	176	12.95	5.76	331	37.91	467
Small	30.16	11.26	56.36	78.41	34.69	128	19.40	3.20	470	48.51	302
<i>All Farms</i>											
Marginal	9.98	10.15	71.43	33.95	24.47	159	10.15	4.83	574	30.49	308
Small	23.77	5.70	32.30	64.86	16.63	109	17.26	3.06	455	40.08	233
Overall	16.75	8.50	56.80	75.38	21.57	103	12.77	4.18	530	34.04	277

Table 2. Season-wise availability of fodder from different sources (q/farm)

Farm size	Rainy season				Winter				Summer			
	Dry fodder		Green fodder		Dry fodder		Green fodder		Dry fodder		Green fodder	
	Own land	CPR land	Own land	CPR land	Own land	CPR land	Own land	CPR land	Own land	CPR land	Own land	CPR land
<i>Zone-I</i>												
Marginal	4.23	0.17	23.42	1.37	9.58	2.69	12.17	3.55	19.21	0.86	4.33	0.08
Small	5.70	-	49.50	0.93	23.10	2.16	15.21	2.38	24.73	0.79	7.87	-
Overall	4.83	0.10	34.11	1.19	15.12	2.47	13.42	3.07	21.47	0.83	5.78	0.05
<i>Zone-II</i>												
Marginal	5.47	0.55	24.94	35.02	31.21	3.10	12.46	16.68	16.18	2.11	6.75	9.00
Small	8.14	-	57.70	29.57	20.68	1.76	41.92	9.84	31.09	1.44	8.95	6.54
Overall	6.35	0.37	35.75	33.22	27.74	2.66	22.17	14.42	21.10	1.89	7.48	8.19
<i>All Farms</i>												
Marginal	4.89	0.38	24.23	19.26	21.08	2.93	12.32	10.53	17.60	1.52	5.62	4.82
Small	6.79	-	53.16	13.70	22.02	1.98	27.12	5.71	27.57	1.08	8.35	2.92
Overall	5.59	0.24	34.93	17.20	21.43	2.58	19.46	8.75	21.20	1.36	6.63	4.12

own land was maximum (21.47 q) in summer followed by winter (15.12 q). The quantity of dry as well as green fodder available from common lands in Zone-I was very low. The available quantity of green fodder per farm from owned land was maximum (34.11 q) in rainy season and lowest in summer (5.78 q). In Zone-II, the available quantity of dry fodder from owned land was maximum (27.74 q) in winter followed by summer (21.10 q). In marginal farms, the maximum quantity of green fodder was available in rainy season, whereas maximum quantity of dry fodder was available in winter and in summer noted for small category of households. The average availability of dry fodder was maximum (21.43 q) / farm) in winter, whereas green fodder was the maximum (34.93 q/farm) from owned land in rainy season. The availability of dry fodder from CPR land was also maximum in winter and green fodder in rainy season.

*Animal grazing:* On an average, the maximum number of

animals (ACUs) were grazed on CPR lands (Table 3) during summer (4.03 ACU/ha), winter (4.06 ACU/ha) and rainy seasons (4.69 ACU/ha) followed by cropped fields. Among different categories of farms, number of animals grazed on CPR lands, cropping fields and own *Ghasni* during different seasons were lower in marginal farms due to less number of animals. The comparison between 2 zones showed that the number of animals grazed were less in Zone-I as compared to Zone-II. In Zone-II, no grazing was done on own *Ghasni* during rainy season.

*Fodder requirement and gap analysis:* Based upon the requirement and availability, fodder balance (deficit or surplus) was estimated (Table 4). The green fodder deficit was the maximum (45%) in Zone-I as compared to Zone-II (38%) with overall deficit of 39%. The deficit of green and dry fodder was 51% and 46%, respectively on small farms of Zone-II. The average per farm deficit of dry fodder in

Table 3. Grazing of animals by farm households during different seasons (ACU/ha/farm)

Particulars	Cattle								
	CPR lands			Cropping fields			Own <i>Ghasni</i>		
	Summer	Winter	Rainy	Summer	Winter	Rainy	Summer	Winter	Rainy
<i>Zone-I</i>									
Marginal	0.57	0.40	1.23	1.10	0.15	0.19	0.17	0.08	-
Small	0.15	0.17	0.29	0.99	0.46	-	-	0.13	0.14
Overall	0.40	0.31	0.85	1.06	0.28	0.11	0.10	0.10	0.06
<i>Zone-II</i>									
Marginal	3.87	3.93	4.60	3.18	1.09	0.41	0.65	0.28	-
Small	15.36	15.73	16.53	4.52	2.57	0.29	1.55	1.51	-
Overall	7.66	7.82	8.54	3.63	1.58	0.37	0.95	0.69	-
<i>All Farms</i>									
Marginal	2.32	2.28	3.02	2.21	0.65	0.30	0.43	0.19	-
Small	6.93	7.11	7.53	2.56	1.40	0.13	0.69	0.75	0.08
Overall	4.03	4.06	4.69	2.34	0.93	0.24	0.52	0.40	0.03

Table 4. Fodder balance analysis of farm households (q/farm/year)

Farm Size	Green grass			Dry grass			% deficit in dry fodder equivalent
	Requirement	Availability	Deficit (%)	Requirement	Availability	Deficit (%)	
<i>Zone-I</i>							
Marginal	97.25	49.25	49.35	49.77	32.74	34.22	35.94
Small	126.92	75.89	40.21	65.86	51.78	21.38	19.41
Overall	109.26	60.18	44.92	56.16	40.54	27.82	28.82
<i>Zone-II</i>							
Marginal	132.98	104.85	21.15	65.89	56.62	14.07	18.01
Small	312.10	154.52	50.49	130.98	71.11	45.70	66.88
Overall	194.57	121.56	37.52	89.11	61.40	31.09	45.71
<i>All Farms</i>							
Marginal	117.97	78.55	33.41	58.05	45.47	21.67	23.68
Small	207.46	110.96	46.51	94.91	60.40	36.36	52.75
Overall	151.97	92.20	39.33	72.73	50.99	29.89	38.70

Zone-I and Zone-II was 27.82, 31.09%, respectively, with an average deficit of 29.89%. The fodder deficit to total requirement on an average farm situation in dry fodder equivalent was about 38.70%. Dev *et al.* (2006) also calculated the fodder gap analysis for Himachal Pradesh. Small farms of Zone-II and marginal farms of Zone-I exhibited the highest deficit of 67% and 36%, respectively. The deficit of fodder for different categories of households varied between 19 to 67%.

The present study concluded that the availability of different type of fodder from owned lands increased with increase in farm size, while the quantity of fodder from public lands decreased with increase in farm size. Quantity of green and dry fodder collected by small farmers was higher from owned land as compared to public land. The farm size-wise analysis showed that the marginal farms depends more on public lands as compared to small farms. The grazing of animals on CPR lands was maximum during winter followed by rainy season. During summer, the maximum grazing was on cultivated fields. The average requirement of dry and green fodder for total livestock per household per annum was 73q and 152q, respectively. The green and dry fodder deficit per farm was 39% and 30%, respectively. Weeds infestation is causing stress and resource competition. Therefore, there is a need to frame a comprehensive policy to eradicate the weeds and to increase the productivity of grasses. To increase the carrying capacity of the lands, rotational grazing must be undertaken. In the plantation programmes, preferences should be given to locally acceptable multi-purpose tree species. The high yielding varieties of legumes and grasses can also be incorporated in the degraded common lands and own

pasture lands. More extension programmes should be undertaken with people participation to enhance the productivity of these land resources.

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