



Fodder budgeting in Jammu and Kashmir: Status, issues and policy implications

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Received: 11 July 2013; Accepted: 28 August 2013

ABSTRACT

The demand for livestock products is increasing at an unprecedented rate in the state of Jammu and Kashmir due to changing socio-economic, nutritional and demographic profile. The state has to spend a whopping sum of Rs 20,000 million (333 million USD) on import of livestock products/inputs like mutton, poultry, feed etc from neighbouring states of Punjab, Haryana, Gujarat etc. The profitability of livestock production systems hinges around the quantity of output produced and quantity of feed consumed besides other factors. The demand-supply scenario of the fodder revealed 7,459 thousand metric tonnes of fodder availability over the estimated requirement of 12,563 thousand metric tonnes for livestock population of 10,938 thousand. The state is 40% deficit in fodder on dry matter basis and the deficiency is more pronounced in the segments of green fodder and concentrates. Strategies need to be framed for improving the productivity of pasture and grazing and other support lands. Institutional mechanisms have to be developed for adoption of optimal system of rotational and deferred grazing and intermittent grazing of cattle/buffalo and sheep/goats. Formulation and implementation of strategy for development of support lands (common property resources) needs greater collaboration among stakeholders with a lead role to animal/sheep husbandry departments.

Key words: Fodder budgeting, Fodder demand-supply scenario, Jammu and Kashmir, Policy implications, Sustainable livestock development

Jammu and Kashmir comprises 3 main physical regions viz. outer Himalayas facing with sub-tropical and intermediate type of climate (Jammu region), lesser Himalayas or temperate zone (Kashmir region) and inner Himalayas or cold arid zone (Ladakh region) (Wani *et al.* 2007). The livestock production system is mainly extensive in Jammu and semi intensive in Kashmir and Ladakh regions although extensive farming is practised for Changthangi pashmina goat in Ladakh (Taneja 2009, Wani *et al.* 2009).

Adequate availability of quality fodder is essential for enhancing livestock productivity (GOI 2007). The productivity of the ruminant in Jammu and Kashmir is below the national average although the state has abundant natural fodder resources in the form of pastures, orchards, aquatic vegetation etc. (Tomar and Lall 1992, Tomar and Sharma 2002). In addition to this, state has forest cover of 20,230 km² (2,023 thousand ha) accounting for 19.95% of the total geographical area of 101,387 km². Excluding the cold desert

region of Ladakh, Jammu and Kashmir regions of the state are having rich forest cover of more than 46% of the total geographical area and is two-fold higher than the national average of 24% (Economic Survey 2012–13). Appropriate strategies are needed for effective utilization of grasslands based on their carrying capacity and nutritive status. Pragmatic planning and formulation of schemes for sustainable livestock development cannot be achieved without estimating the feed budget of the state. In this backdrop, the present study was undertaken to focus on: (i) fodder inventory of the state, (ii) fodder demand-supply policy analysis for sustainable fodder-livestock development scenario of the state.

MATERIAL AND METHODS

The study is part of a University Grants Commission sponsored project entitled 'Prospectus of livestock enterprise for livelihood security in Jammu and Kashmir' carried out in the state during the period 2008–11. Both primary and secondary data were used to interpret the results. Primary data were collected from 300 households from subtropical zone (Jammu region), valley temperate zone (Kashmir region) and cold arid zone (Ladakh region) rearing livestock (100 from each region). These delineated districts can be

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considered as representative districts of a micro climate with respect to agro-climatic and socio economic conditions. The secondary sources include (i) discussions with scientists and field functionaries associated with different aspects of livestock/fodder development programmes of state, and (ii) consideration of selected reference works, books, and research and extension papers pertaining to feed, fodder and livestock of the state. The compound annual growth rate (CAGR) for time series data was calculated using following log linear regression model

$$Y = a + b \log t$$

where, Y, dependent variable; t, time; a is intercept and b, slope coefficient.

RESULTS AND DISCUSSION

Forage yield estimation was made from the resources like common and private support lands for grazing, cultivated fodder and crop residues as per land use classification of the state depicted in Table 1. The recommended forage yield in tonnes per hectares served as the base to work out availability of fodder on dry matter basis from different resources. Cultivated fodder yielded highest forage (8 tonnes/ha) followed by grass from bunds in paddy fields (5 tonnes/ha) and lowest for tree groups (0.5 tonnes/ha). Forage yield on dry matter basis of some common support lands and other resources is presented in Fig. 1. Forage yield from crop residues like straw from wheat, paddy and barley, stovers of maize, millets and legumes, worked out on the basis of

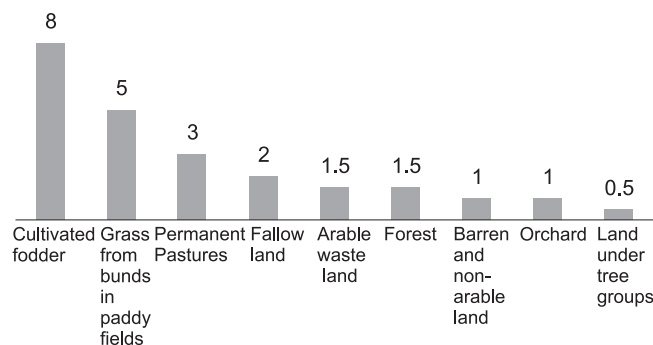


Fig. 1. Forage yield on dry matter basis (tonnes/ha).

extraction ratio of these cultivated crops, are presented in Fig.2. The productivity and health of livestock mostly depends on feeding practices and the quality of feed and fodder provided to the animals. The recommended fodder dose as proposed by Banerjee (1997) for different animal species was used as a base to work out total fodder requirements and is presented in Fig.3. The livestock population of the state was converted into standard animal units (SAU's) (Patel *et al.* 1976) and was worked out as under. Adult bovine (cow, buffalo, yak) and equine (horse, donkey etc), 1SAU; young stock, ½ SAU; small ruminant (sheep and goat), 1/5 SAU.

Stock, growth and structural changes in livestock population: The livestock species which contributed

Table 1. Availability of land for feed resources of J and K ('000, ha)

Particulars	Source	Jammu	Kashmir	Ladakh	J and K
Common support lands	Forest (As per village papers)	652.48	5.23	0.06	658
	Barren and uncultivable land	229.12	29.13	29.75	288
	Cultivable waste land	109.07	33.50	7.43	150
	Land under tree groups	56.36	9.46	1.54	67
	Permanent Pastures	82.90	44.40	1.09	128
	Non Agricultural land	227.22	56.45	4.08	288
Total		1357	178	44	1579
Private support lands	Fallow lands	37.36	50.27	0.71	88
	Orchards	2.84	83.78	0.80	87
	Grass from bunds in paddy fields (5% of area)	5.84	7.04	-	13
Total		46	141	2	189
Cultivated fodder	Fodder crops	23.27	8.92	2.03	34.22
Residues from leguminous crops (straw I)	All pulses	19.07	10.07	0.85	30
Residues from coarse grain crops (straw II)	Maize	226.00	89.80	-	316
	Millets	20.49	0.72	0.87	22
Residues from fine grain crops (straw III)	Paddy straw	116.87	140.75	-	258
	Wheat straw	273.68	0.64	4.40	279
	Barley	10.37	-	3.10	13
Total		690	251	11	952
Forest	Area maintained by Forest dept.	1207	813	3	2023
Overall total		3300	1383	60	4743

Source: Digest of Statistics, Directorate of Economics and Statistics, J and K Govt. (2010-11)

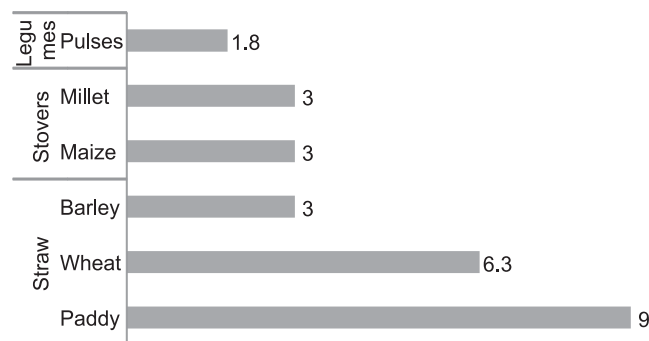


Fig. 2. Crop residue yield on dry matter basis (tonnes/ha).

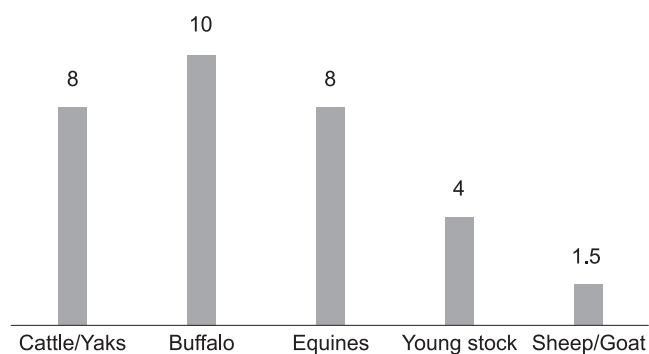


Fig. 3. Fodder requirement on dry matter basis (kg/animal/day).

significantly in the output from this sector included the bovine species (cattle, buffalo and yaks), small ruminants (sheep and goat) and to a less extent the equines (horse, pony, donkey besides camel etc). The 18th Livestock Census revealed that 65, 29 and 6% population was supported by Jammu, Kashmir and Ladakh regions, respectively (Fig. 4). In Kashmir region, Baramulla district had the highest livestock population followed by Anantnag and lowest was recorded in the district of Srinagar. In Jammu region the highest livestock population was recorded in the district of Doda followed by that in Udhampur and the lowest number was recorded in Jammu and in Ladakh. Kargil had more livestock population than Leh district. The growth analysis of livestock population revealed an increase from 8,689 thousands in 1992 to 10,938 thousand in 2007 with a compound annual growth rate (CAGR) of 1.55%. Jammu region registered the highest compound growth rate of 2.23% as compared to 0.44% in Kashmir and 0.28% in Ladakh divisions during 1992 and 2007. Overall, the results showed that livestock sector in the state is growing and adapting to the emerging socio economic requirements of the region.

Dairy farming is becoming a commercial activity and the elite farmers have brought notable changes in composition of herd size with better quality of dairy animals. This phenomenon is triggering growth in crossbred cattle population leading to a deceleration in local cattle population. The concentration of crossbred cattle was more in Kashmir

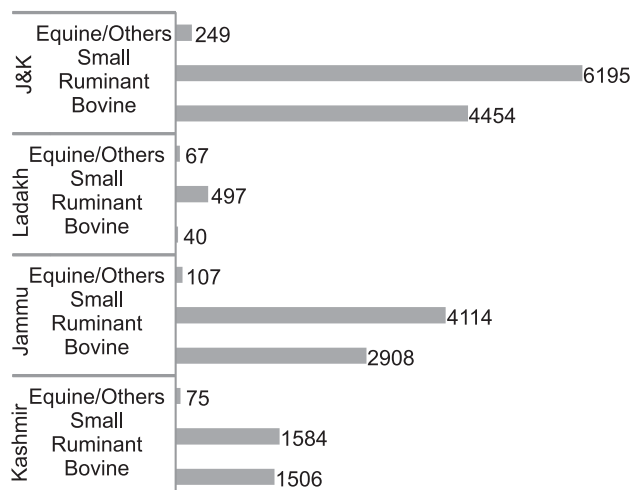


Fig. 4. Livestock population as per 2007 census ('000).

region (61% of total cattle) compared to Jammu region (36% of total cattle). The higher concentration of crossbred in Kashmir region could be due to early adoption of cross breeding programme and suitability of climatic conditions. Growth rates of crossbred cattle revealed impressive population increase with compound annual growth rate (CAGR) of 5.13% in the state for the period 1992-2007. There were significant regional differences in these growth rates. The growth rate in crossbred cattle was maximum in the Ladakh region (7.96%), followed by Kashmir (5.33%) and minimum in Jammu (4.71%).

The concentration of local stock (67% of total cattle) was more pronounced in Jammu region of state. This is primarily because of non-adaptability of crossbred cattle to majority of hilly areas of the Jammu region. As per livestock census observations, the stock of local cattle declined from 1992 to 2007 with a CAGR of -1.64%. However, growth rate (0.58%) turned positive for Jammu region.

The contribution of buffalo in Kashmir and Ladakh regions of the state is negligible. Most of the buffalo population is migratory with a base in Jammu region. Buffalo population in Jammu region increased from 1992-2007 with a CAGR of 2.94% and showed decelerated trend with a CAGR of -1.21% in Kashmir region. Similarly, the small ruminant population increased @ 1.84%/annum. Region wise 2.39%, 1.03% and 0.39% growth rate was achieved in Jammu, Kashmir and Ladakh, respectively. Some of the districts like Baramulla, Budgam, Srinagar, Doda, Rajouri, Poonch, and Leh have achieved very high growth rate in small ruminant population during the same period. This warrants in depth study for scope of improving densities in other districts by proper planning.

Land availability for feed resources: Feed for animals are available from cultivated as well as uncultivated lands. The uncultivated lands, as a source of feed include 2 major sources, viz. common and private support lands. Common

support lands (CPRs) include the barren line forests outside the forest area and the forest area maintained by forest department; barren and uncultivable land; cultivable waste land; land under tree groups; permanent pastures and non agricultural land. These CPRs constitute the most important input for livestock production and subsistence for the poor. Private support lands for grazing include grasses from bunds in paddy fields; fallow lands and orchards. Available feed resources from cultivated lands can be classified into four important groups, viz. (i) cultivated fodder (most commonly oats, barseem and alfalfa) (ii) straw-I, (residues from leguminous crops including pulses), (iii) straw-II, (residues from coarse grain crops including maize and millets), and (iv) straw-III, (residues from fine grain crops like paddy, wheat and barley).

The lush green forests in Jammu and Kashmir serve as the most important support land for livestock of the state. The majority of the land categorized as the area under common support land lies in Jammu (86%) and the rest is distributed in Kashmir (11%) and Ladakh (3%) regions. Ladakh region also has vast CPRs in the form of main and collateral valleys, mountains and other barren and wastelands which have thin and sparse vegetation but serves as grazing land for large and small ruminants. Residues from crops are most important feed source for livestock in the state. Area under different crops as per Digest of Statistics 2008–2009 is 918 thousand hectares of which 73%, 26% and 9% area is in Jammu, Kashmir and Ladakh divisions, respectively. Area under cultivated fodder was 34,000 ha, and 12,000 ha area is available for grasses under bunds of paddy fields. Jammu region has 3 fold higher areas under cultivated fodder crops than Kashmir region (Table 1).

Feeding practices and fodder consumption: The feeds constitute the largest expenditure in livestock production and vary from 50 to 75% to total production cost (Wani *et al.* 2010). Climate based feeding practices were popular in the state. The entire population of animals in the state is partly grazed and partly stall fed but only stall fed in urban areas. The animals are more grazed and less stall fed during summer and only stall fed during winter in Kashmir and Ladakh regions, while grazing continues throughout the year in Jammu region. In most of the rural areas, except lactating cows, all other animals (dry cows, draught animals, young stock and sheep and goats) migrate for longer distances (60–300 km) towards high alpine pastures for 4 to 5 months during summer.

Some nomadic communities of state remain in migration along with livestock throughout the year in different parts of the state. Local grazing lands (*gascharai*) in each village are available in vicinity with poor grazing quality due to tragedy of commons.

The analysis of feed consumption data collected through Integrated Sample Survey (ISS, 1999–2000 to 2008–09) is presented in Fig. 5. Overall, the ration of dairy animals

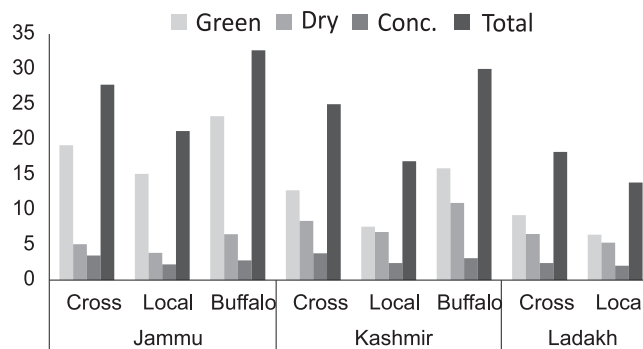


Fig. 5. Average consumption of feed by milch animals (kg/day).

*Source: Integrated Sample Survey on estimation of major livestock population/products, J and K (2008–2009). ** Compound annual growth rate (CAGR) calculated for the period 1999–2009.

included more green and less dry fodder in Jammu region. Growth in milk production is attributed to improvement in breed as well as feed and fodder consumption. Consumption of feed and fodder by milch stock over last 10 years in Jammu, Kashmir and Ladakh regions grew at the rate of 1.03%, 1.11% and 1.17% in crossbred cows and 1.18%, 1.13% and 1.47% in local cows, respectively. On the other hand feed and fodder consumption of buffalo in Jammu region grew with CAGR of 1.07%.

Availability of fodder: Fodder production is primarily a land use activity and depends on multiple factors like climate, irrigation, livestock number and type besides cropping pattern (Arya *et al.* 2011). Two important sources of fodder for livestock are uncultivated land (support land) and cultivated land. The fodder availability computed on dry matter basis in the state from different sources is presented in Table 2. The important cultivated fodder crops are barseem in Jammu, oats in Kashmir and alfalfa in Ladakh. Paddy and wheat straw, maize stall and other crop residues constitute basic bulk roughage materials for ruminant in the state. However, bulks of these roughages are usually deficient in critical nutrients. The yield of fodder from these crops on dry matter basis has been worked out as 4,613 thousand metric tonnes, of which 71%, 28% and 1% was available in Jammu, Kashmir and Ladakh regions, respectively. The common property resources reflected in Table 2 yielded 2,572 thousand metric tonnes of fodder on dry matter basis out of which 77% is contributed by Jammu region and 21% by Kashmir region. Moreover, estimates of Horticulture Department of the state revealed more than 325 thousand hectares under orchards. Scope exists in introduction of fodder crops as inter-crop in orchards. In addition to this, huge forest cover serves source of 3,035 thousand metric tonnes of fodder yield on dry matter basis.

Fodder demand supply scenario: The profitability of enterprise hinges around adequate feed and fodder supply demand balance sheet. An analysis of information on available fodder from various sources in Jammu and Kashmir

Table 2. Availability of fodder on dry matter basis for J and K ('000 tonnes)

Group	Availability/production of fodder from land under resource*	Jammu	Kashmir	Ladakh	J and K
I	Uncultivated fodder availability from common support lands				
	Forests (village papers)	978.72	7.85	0.09	986.66
	Barren and un-cultivated land	229.12	29.13	29.75	288.00
	Non-Agricultural land	227.22	56.45	4.08	287.75
	Cultivated wasteland	163.60	50.25	11.15	225.00
	Permanent pastures	248.82	133.20	3.27	385.29
	Land under tree group	28.18	4.73	0.77	33.68
	Total	1875.66	281.61	49.11	2206.38
II	Uncultivated fodder availability from private support lands				
	Fallow land	74.72	100.54	1.42	176.68
	Orchard	2.84	83.78	0.80	87.42
	Fodder from bunds in paddy fields (5% of total paddy land)	29.20	35.20	0.00	64.40
	Total	106.76	219.52	2.22	328.50
III	Cultivated fodder/crop-residues- straws, stovers				
	fodder crops	186.16	71.36	16.24	273.76
	Rice	701	845	-	1546
	Maize	1014	403	-	1417
	Pulses	76	40	3	119
	Millet	82	2	4	88
	Wheat	1363	4	22	1389
	Barley	41	-	12	53
	Total	3463.16	1365.36	57.24	4885.76
	Grand total	5445.58	1866.49	108.57	7420.64
IV	Forests	1809.90	1219.20	5.40	3034.50

*Computed as per figures available in Digest of Statistics (2010–11).

vis-a-vis estimated fodder requirement for the entire population of 10,938 thousands livestock revealed that the state has 7,459 thousand metric tonnes of fodder availability over estimated requirement of 12,563 thousand metric tonnes. The severity of fodder deficit is more chronic in Ladakh region and the gap between demand and supply budget is to the tune of 85% followed by Kashmir region (48%) and Jammu region (33%) (Fig. 6). However, in actual practice Ladakh region had adequate land resources but thin and sparse vegetation due to harsh agro climatic conditions (Wani *et al.* 2008, 2009). Overall, lack of data and inventory on fodder production is a hindrance to planning and formulation of schemes.

The interaction between forest and livestock production in general and small ruminant production system in particular are seen as building blocks of human livelihoods. Combining forests and livestock production systems implies a more diverse livelihood portfolio and source of relief to fodder balance sheet. Therefore, fodder budgeting of state cannot be dealt in isolation without considering the forests as a source of fodder. In Jammu, Kashmir and Ladakh regions of state, forests are source of 1,809.9, 1,219.2 and 5.40 thousand tonnes of fodder, respectively on dry matter basis. The cumulative effect of forest as a source of fodder has led to bridge the gap between requirement and availability of fodder portfolio substantially. Overall, the state is 40% deficit in

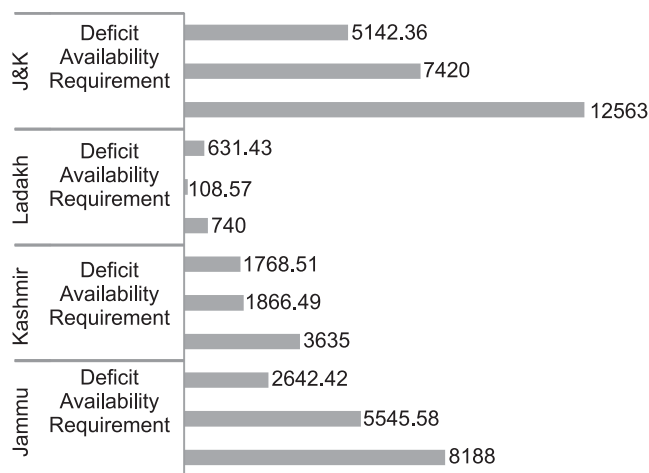


Fig. 6. Fodder budgeting on dry matter basis ('000 tonnes).

fodder on dry matter basis and the deficiency is more pronounced in green fodder and concentrates. Average milk productivity of crossbred cow is 145% higher than local cow; accordingly, indigenous cattle should be phased out to meet economic demand of milk production with a minimum burden on feed resources. Moreover, crossbred cattle are suitable to in-house rearing conditions and small ruminant on extensive and semi-intensive system of management. Therefore, high land pastures and forest area should be

reserved for small ruminant to meet/sustain demand of both mutton and milk production.

Policy implication

Total livestock population of 10,938 thousand was revealed by the 18th Livestock Census in the state. During last 2 decades, growth analysis of livestock population showed positive growth momentum in crossbred cattle, buffalo and small ruminant population while as decelerated trend in local cattle population. The fodder budgeting analysis revealed state as 40% deficit on dry matter basis. Acute shortage of fodder particularly during winter has negative impact on adoption of livestock based production system. Therefore, there is a need to address fodder problems so that livestock based production system is adapted widely. However, without clear understanding problems of feed as an important input for the livestock development of the state, the programme to minimize import bill on livestock products will not succeed. Following lessons can be drawn while focusing feed livestock budgeting issues of the state to flag agenda for research and planning and to provide recommendations. Attention/strategies need to be framed for improving the productivity of pastures, grazing and other support lands. Institutional mechanisms have to be developed for adoption of optimal system of rotational and deferred grazing and intermittent grazing of cattle/buffalo and sheep/goats. Formulation and implementation of strategy for development of support lands (common property resources) needs greater collaboration among forest, agriculture, animal and sheep husbandry, revenue departments and local bodies. The departments of animal/sheep husbandry, the main stakeholder, may be given lead role for fodder development programmes. Furthermore, a well organized survey is required with the objective of identification of support land resources suitable for large scale re-seeding with legumes and non-legumes and introduction of fodder trees and shrubs. Other areas which can be targeted while formulating policies for fodder development of state are to: enhance and target cultivated fodder using current fallow land available in *rabi* season; minimization of paddy straw used in apple industry as a packing material; protocol for treatment of roughages for nutritional improvement through biotechnological interventions; introduction of feed blocks, densification etc; protocol for use of apple pomace in feed industry; establishment of community feed/fodder banks as is in vogue in Changthang area of state; harvesting the potential of aquatic vegetation around large sized freshwater bodies (lakes) for livestock feeding; identification of areas having scope for increasing the livestock densities (stocking rate) by proper planning; survey of nomadic migratory routes, rights of stakeholders on pastures. Moreover, contribution of 45% by livestock sector to state Agriculture GDP demands proportionately higher budgetary allocation to boost feed

resource base.

ACKNOWLEDGEMENT

The work has been supported by the University Grants Commission (UGC), New Delhi under the project No. F. No. HRP-156/2008.

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