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Analysis of selected fodder ventures in southern and western India

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Abstract
Business opportunities in fodder are tremendous in India but less capitalised by development agencies. Ventures capitalized trading of fodder in various forms is less and study to analyse these ventures was conducted (2012-2014) sourcing primary and secondary data. Objectives of the study were to determine scale of operation, understand role of different stakeholders and identify constraints and opportunities of three selected ventures (V). Scale of commercialization for sorghum stover processing and trading was highest (V1, Rs 230 million) followed by lucerne seed production and sale (V2, Rs 1066.6 million) and lucerne leaf meal production and sale (V3, Rs 4.28 million). Six stakeholders involved in ventures were identified. Retailers (V1), first level middlemen (V2) and second level middle men (V3) were absent in respective ventures. Government intervention (V1), slow tedious process of cleaning cuscuta infested seed (V2) and labour (V3) were foremost constraints. Enriching chaffed sorghum stover (V1), line sowing for improved seed yield (V2) and prevalence of huge demand (V3) were identified as the top opportunities. These ventures which are less known but highly successful are worth emulating by other entrepreneurs to tap market potential and improve feed accessibility in deficit regions of the country.

Keywords: Commercialization, Leaf meal, Seed, Stakeholders, Stover, Trading

Introduction

Crop residue is the main source of fodder in India (Das *et al.,* 2017) on which 70 per cent of livestock is sustained. Even after India being world number one in milk production, the land allocation to cultivation of green fodder crops is limited and has hardly ever exceeded 5 per cent of the gross cropped area. Small land holdings though are one of the reasons, but more than 80 per cent of livestock is owned by marginal, small and semi medium farmers (NSSO, 2015). Small land holders though inclined but are unable to spare land for cultivating fodder crops as food grain crops to meet household requirement dominates. This poses real challenge for the diffusion of forage technologies to farmers of the country.

Feeding of forage to dairy animals is essential for economic and sustainable milk production (Mahanta *et al.,* 2009). Maximization of forage in the diet of dairy animal makes their ration much cheaper as compared to concentrates based ration (Gaikwad and Gampower, 1995). Improved grasses have high residual fertility utilization capacity (Scoones, 1992). In spite of several benefits of fodder crops, many line departments *viz*., State Departments of Agriculture, Animal Husbandry and Veterinary Services (AHVS), Horticulture and Development Agencies consider fodder technologies at subsistence level. Livestock farmers of coastal region with high rainfall in Karnataka purchase dry fodder from drier areas. This indicates that fodder (both crop residue and cultivated fodder) is traded for commercial value on large scales in some parts of the country. The documentation of such commercial ventures of the country was required to ignite the minds of trainers, development workers, policy makers and farmers about the commercial value of fodder in the country. Several non government organisations seek technologies having entrepreneurial value in fodder. Therefore, to demonstrate the commercial value of fodder, a study was carried out to determine scale of operation, understand role of different stakeholders and identify constraints and opportunities of three selected business ventures related to fodder aspects.

Materials and Methods

Business ventures identified: Three fodder ventures were studied in southern and western part of India covering Karnataka and Tamil Nadu states of south India, Gujarat and Rajasthan states of western India between 2012 and 2014. There is large scale processing and trading of sorghum (*Sorghum bicolour L.)* stover in

northern Karnataka, which is taken as one venture (V1). Much of the lucerne (*Medicago sativa* L.) seed in India comes from western part of the country. When several farmers are reluctant to spare their lands for fodder crops, it becomes much sense to know how this business operates. The production and sale of lucerne seeds was another venture (V2) considered for the study. Lucerne leaf meal production in Tamil Nadu and Karnataka were considered as third venture (V3) for the study. These three ventures formed the subject of the study which were analysed using case study method to collect contextual information and understand the complex issues.

Field survey planning: Initial reconnaissance survey of the ventures helped to get the idea of the information sources available based on which checklists for range of actors in the venture (entrepreneurs, producers, processors, middlemen and end users etc) were prepared. Detail planning for the survey of each venture was made in accordance with the peak period of business. Study basically focussed on extensive field work in four states as published information about such ventures was lacking.

Data collection and analysis: Both primary and secondary sources were consulted for gathering data. Primary data collection was done through focus group discussions with different actors in the businesses. Secondary sources like available records of entrepreneurs, national seeds corporations, milk federations and regulated markets were consulted. Business volume and value for each venture for five years were collected from total number of firms engaged (V1-29,V2-25, V3-2) and analysed using averages to estimate the commercial value of the venture in terms of yearly business volume and value. Stakeholder analysis, SWOT analysis and matrix ranking techniques were employed for qualitative data collection and analysis.

Results and Discussion

Venture on processing and trading of sorghum stover in Karnataka: Sarwad village of Bijapur district and Yadawad village of Belgaum district which is located adjacent to Bijapur district, both in Karnataka were the two places where sorghum stover processing is being done in large scales. Sorghum stover is procured from the places located in 150 km (Sarwad) to 250 km radius (Yadawad). Tractor mounted mobile type chaff cutters are used in Sarwad village where sorghum stover is chaffed in the farmers' fields itself. In Yadawad, fixed type chaff cutters are used for which huge infrastructure to process and to store the procured stover is created. The total annual volume of the business of sorghum stover processing and sale was 37000 tons and the value was Rs.-230 million annually with forward linkage of marketing in 4 states *viz*., Karnataka, Maharashtra, Goa and Gujarat (Table 1). Sorghum processing and sale units are located in traditionally sorghum growing belts of Karnataka. Fifty percent of the sorghum production in the state is contributed from undivided Bijapur district. Soil type and rainfall pattern favour cultivation of this crop. Water scarcity in the district forces farmers to maintain small herd size. Due to small herd size, large holdings and large area under *rabi* sorghum, sorghum stover is available in surplus with the farmers. This is the reason for trading 37000 t of sorghum stover annually by these units (Table 1). Blummel and Rao (2006) reported that sorghum stover, the above-ground biomass left after grain harvest, supports much of the urban and peri-urban dairy production in peninsular India. Some of the stover is transported several hundred kilometers and costs, on a dry weight basis, about 50% of the price of sorghum grain. The annual value of chopped sorghum stover transported into Hyderabad was estimated to range from Indian Rs 140 million to 160 million (approximately US$ 3–3.5 million). The growing demand for milk and therefore fodder has not only affected transport distances but also changed the grain-to-stover price ratio. The price of sorghum stover in Hyderabad's fodder markets in the late 1970s was about one-fourth of the grain price. The average sorghum stover price is now approximately half that of the average grain price. During the last 30 years the role of sorghum as a major source of fodder has not diminished, rather its importance as a forage crop has increased (Tonapi *et al.,* 2011). The sorghum stover if it is baled considerably

Table 1. Scale of commercialization of *rabi* sorghum stover processing and marketing in Karnataka

Location	Area of procurement	Type of machine	Output (t/year)	Scale of operation (Rs)	Forward linkage
Sarwad (Bijapur)	150 km	Mobile type chaff cutters No.14	27000	160 million	Maharashtra, Karnataka, Goa and Gujarat
Yadawad (Belgaum)	250 km	Fixed type chaff cutters No.15	10000	70 million	Maharashtra, Karnataka, Goa and Gujarat
Total			37000	230 million	

Source: Data collected for the study during 2012-2014

saves transportation cost. However, use of baling machine is not known to traders or growers in the study area. Dry leaf sheath of sorghum stover known to add fodder value is damaged in baling process thus affecting its quality was the response while demonstrating baling machine to sorghum growers (Biradar *et al.,* 2011). Thus there is a need to work out alternative methods like adding molasses available from nearby sugar industries for compaction to make transportation easier, cheaper besides increasing its nutritive value.

Venture on lucerne seed production and sale in Gujarat: Lucerne seed is traded through four channels- highest through Mandi, an open market yard (2840 t/yr, Rs 677.6 million) followed by private seed traders (1306 t/yr, Rs 311.5 million). Share of seed corporations (283 t/yr, Rs 67.5 million) and milk cooperatives (42 t/yr, Rs 10.0 million) were less while mandi and private seed traders together occupied 92.73 per cent of market share in lucerne seed business. The total annual volume of business of lucerne seed production and sale in Gujarat, (Table 2) was 4471 tons with the commercial value of Rs 1066.6 millions. The seed is sent to different places in India, mainly to south, central and western India.

Table 2. Scale of commercialization of lucerne seed production and sale in Gujarat

Type	Volume (t/yr)	Value (million Rs)	Percent share
Mandi	2840	677.6	63.53
Private traders	1306	311.5	29.2
Seed Corporations	283	67.5	6.33
Milk Cooperatives	42	10.0	0.94
Total	4471	1066.6	100
Forward linkage	South, central and western India, Saudi Arabia and Pakistan		

Lucerne is one of the highly sought leguminous fodder crops in many irrigated areas of Karnataka, Maharashtra, Tamil Nadu and Andhra Pradesh due to quick realisation of increase in milk yield by its feeding to dairy animals besides for its medicinal properties. Since seed production is restricted in west and northern area of Gujarat and some parts of Rajasthan seed distribution network hardly reaches other parts of the country. Lucerne seeds are traded mainly through open mandis/markets (Table 2). Seed corporations which has large network of seed distribution system in different parts of the country handles only 6.33 percent of seeds traded. The average seed price (per kg) in Gujarat is Rs 239 (Min: Rs 100 Max: Rs 330) and due to artificial shortage created by lack of distribution system there are instances where seed is sold four times of its original price in different states. Private traders handle only one third of the produce majority meeting local demand and one private trader with annual seed handling of 650 t exports the seeds to countries like Saudi Arabia and Pakistan. The estimate of the quantity of raw lucerne seed exported by USA is approximately 1950 million rupees (Frey *et al.,* 2008).

Lucerne leaf meal production and sale in Tamil Nadu and Karnataka: Two firms each in Tamil Nadu and Karnataka have ventured into lucerne leaf meal production and sale. Both of them operate in the mode of contract farming for procuring the fresh lucerne. Supa farm of Tamil Nadu is 35 years old and has systematic network and infrastructure to procure lucerne, process and sell leaf meal. Annually 120 tons of lucerne leaf meal of worth Rs 3.6 million is sold to 4 states of India including Punjab. Pawar Medi Herbs is 4 years old business unit and apart from other herbs procuring and processing, it also does business of lucerne leaf meal production and sale. The total annual volume of business of lucerne leaf meal production and sale, together in Tamil Nadu and Karnataka was 160 tons/ year with the commercial value of Rs 4.28 million (Table 3).

Stakeholders and role analysis: Six stakeholders are involved in these three business ventures. Retailers are absent in case of sorghum stover processing and sale as second level middlemen directly sells to several end users. In lucerne seed production and sale, retailers directly purchase from processors, so second level middlemen was absent. Lucerne leaf meal production

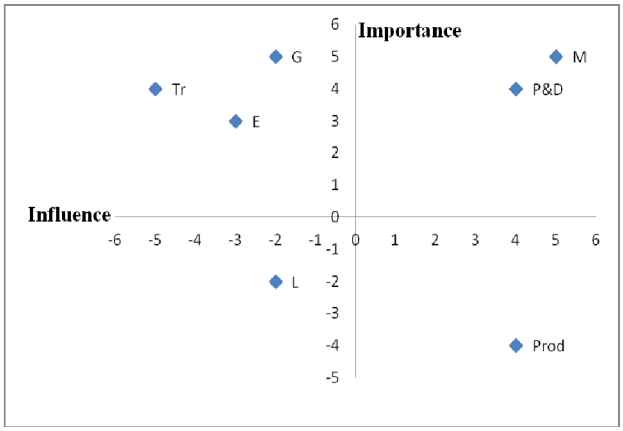
Table 3. Scale of commercialization of lucerne leaf meal production and sale in Tamil Nadu and Karnataka

Firms	Type	Volume (t/yr)	Value (million Rs)	Coverage
Supa farm village A G Pudur, Coimbatore	Contract farming since 1985	120	3.60	Karnataka, Maharashtra, Tamil Nadu and Punjab
Pawar Medi Herbs Village Kalasapur, Gadag	Contract farming since 2010	40	0.68*	Karnataka
	Total	160	4.28	

*In Gadag selling price of lucerne leaf meal Rs.17/kg and in Coimbatore Rs.30-35/kg

and sale do not have first level middlemen to procure the fresh lucerne due to contract farming system of operation. The conflicting interest of government and processors was found in case of sorghum stover processing and sale. In other two ventures government role was restricted to producing foundation seeds and recommending new varieties released for the region.

Role analysis of different actors (Fig 1) revealed that middlemen enjoyed the high importance and influence in the business, followed by the processors. Producers though had high influence but the importance was low for them. Labourers had low importance and influence in the business. Government departments had high importance but low influence as they recognize these ventures as less important ones. End users had high importance but low influence to the business as the market existing was a kind of oligopoly where only few players operated the market. This analysis indicates dominance of middlemen in the business ventures studied which needs to be addressed to ensure fair price to the end users.



G: Govt Tr: Transporters E: End users L: Labours engaged P&D: Processor and dealers M: Middlemen Prod: Producers

Fig 1. Importance and influence matrix of stakeholders

Constraints and opportunities: Three constraints and 7 opportunies were listed for sorghum stover processing and sale (Table 4). The major constraint was governement interventions like regulating fodder transport across different districts without any advance information to the traders by putting checkposts which discourages traders to expand their businesses. Out of seven opportunities, firms feel that if they add value to the (enrichment) chaffed material they can increase the selling price. Singh *et al.* (2017) reported that improved fodder varieties have potential to enhance yield in all the crops including sorghum. There were 8 constraints for lucerne seed production, the important being the tedious and slow seed processing and breeder seed infested with the Cuscuta seeds. Among 5 opportunites, encouraging farmers to go for line sowing to save costly seeds and lucerne leafmeal production were the important ones. Labour constraint was the major one for lucerne leaf meal production among 4 constraints listed and high demand for it was the major opportunity available.

Sorghum stover is preferred over maize stover as the latter has less starch once dried, it is less prone to fungal attack as compared to maize stover thus having better keeping quality. State animal husbandry department is not in a position to promote these ventures as they are commercial in nature that are also reported to be responsible for creating artificial shortage of dry fodder in the state, resulting in inflated the rates of sorghum stover. However, it occasionally regulates fodder transport between districts and states by establishing border check-posts. Therefore, policy guidelines are required for registration of traders and regulation of fodder movement in order to prevent their exploitation by officials. The sorghum trading model can also be promoted for high-yielding popular hybrids of maize (Macmillan, 2013) to reduce not only the dry fodder shortage, which is to the extent of 40 per cent (DAHD, 2013), in the country but also to prevent the practice of maize stover burning by the growers.

Getting the quality lucerne seed without cuscuta infestation is a big challenge for farmers and traders which require the intervention of research organisations and state line departments especially cleaning of seed (processing) and sale of poor quality seeds in open markets. Majority of the growers sell fresh cut lucerne on daily basis to middlemen who transport it to Chennai market and only limited number of them trade in contract mode with the firm. A study on marketing and pricing of alfalfa hay at Oklahoma revealed that the harvesting package affects the cost of transporting and handling alfalfa (Ward, 2004). Many farmers expressed that growing lucerne is highly profitable compared to other crops. Putnam *et al.* (2007) reported that alfalfa hay has been traded crop since several years in US. The neighbouring China also provides great potential for lucerne leaf meal as it imports from the world increased from CAD$30,000 in 2006 to CAD$294,000 in 2008 (International Market Bureau, 2010). Most of the constraints in these ventures are related to deficit policy aspects, lack of mechanisation and credit facilities.

Table 4. Constraints faced and opportunities available to the ventures

Venture	Constraints	Opportunities
Sorghum stover processing and sale	1. Government interventions hinder the market expansion 2. Rain may spoil stored chaffed material leading to loss 3. Registration of firms is not possible due to lack of policy guidelines. So material during transit cannot be insured and loss if any to be borne by the firm	1. Processing and addition of value to chaffed material 2. Excess stover availability favour business expansion 3. High demand from end users lead to better equilibrium price 4. Scarce ground water favour cultivation of sorghum 5. Good price for sorghum grain and stover 6. Large land holdings 7. Continued availability of stover for sale due to small herd size in households
Lucerne seed production	1. Tedious seed processing 2. Infestation of breeder seed with cuscuta 3. Availability of many not recognised varieties 4. Higher seed loss while processing for cuscuta free seeds 5. Weak network for estimating seed demand 6. High cost of irrigation discourages lucerne cultivation as perennial crop 7. In Gujarat, lucerne is not included in mini-kit programs of AHVS department 8. No subsidy for the lucerne seed production.	1. Line sowing (12-15 kg/ha) than broadcasting (25kg/ha) to save seed and high seed yield 2. Export potential to neighbouring countries 3. Huge scope for lucerne leaf meal production and sale 4. Zn/boron spray increases seed production by 20% 5. Sweet water favours vegetative growth and saline water favours seed production
Lucerne leaf meal production	1. Labour for frequent harvesting of crop (labours are paid on hourly basis) 2. Difficulty to access the credit from banks to expand the business 3. Cuscuta infestation 4. Wilt and root rot infection	1. Demand is more (nearly 100 ton per year order) 2. Saline water provides the greater opportunity as lucerne tolerates saline water 3. Typical weather of the Palladam region congenial for drying

Conclusion

It was inferred that all the three ventures have great scope to mechanise labour intensive operations, especially harvesting of lucerne, seed cleaning, pelleting of leaf meal, and baling of sorghum stover which require credit access from financial institutions to entrepreneurs. Creating conducive environment for smooth and successful running of fodder business ventures is required in the country to boost its growing livestock industry.

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