J Hum Ecol, 57(1,2): 25-30 (2017)
DOI:10.31901/24566608.2017/57.1-2.04

Analysis of Favorable Factors for Continued Adoption of Perennial Fodder Crops by Livestock Farmers

Partha Banerjee[1] and Nagaratna B. Biradar[2*]

[1]Department of Agricultural Extension Education, UAS, Dharwad 580005, Karnataka, India
[2]Indian Grassland and Fodder Research Institute, SRRS, Dharwad 580005, Karnataka, India

KEYWORDS Herd Size. Innovative Proneness. Land Holding. Perceived Attributes of Innovation

ABSTRACT A study to analyse the favorable factors for continued adoption of perennial fodder crops by livestock farmers was conducted. Ninety-five perennial fodder growing farmers of two districts of Karnataka, viz., Belagavi and Dharwad, identified through snowball technique were interviewed using standardized interview schedule. Out of 19 variables used for the study, 15 variables exhibited positive and significant relationship with continuance of perennial fodder crops by adopters. Four predictors have been retained at the last step of screening through regression analysis. In path analysis, 11 variables indicated positive direct effect and 8 variables shown negative direct effect on continuance of perennial fodder crops cultivation. Innovative farmers with high annual income and big land holdings should be targeted to involve in participatory approach for the production of fodder planting materials.

INTRODUCTION

Crop sector continues to dominate the overall agricultural economy of India, but the importance of livestock has gained momentum during recent years. Animal husbandry and dairying activities, hitherto considered as supplementary to crop production, are being transformed into organized and industrialized production. The contribution of livestock to agriculture Gross Domestic Product (GDP) is twenty-eight percent and accounts for five percent of total GDP, which was 4.70 percent in 2004-05 (Planning Commission GOI 2012). In India where over seventy-five percent farmers are small and marginal holders, livestock is the main source of livelihood for a majority of the rural population (Hegde 2006). Livestock have been contributing about fifteen percent - twenty percent to the household income of farmers, which has been steadily increasing during recent years. Among different products, milk is the major output contributing to the GDP as well as to food security. In fact, the contribution of milk to GDP (5.86%) is more than the contribution of rice (5.77%) (Hegde 2006). With the increase in per capita income and urbanization, the consumption of livestock products will continue to rise in the foreseeable future. Consequently, the demand for feed and fodder for feeding and fattening of livestock will also increase.

*Address for correspondence:
E-mail: nagaratna123@gmail.com

The economic viability of livestock husbandry is dependent on the genetic potential for production, good health care, balanced feeding of animals and efficient marketing of the produce. While genetic improvement and health care are the prerequisites for sustainability, efficient feeding and marketing will help in increasing the profitability (Kannan 2012). However, the profitability is directly dependent on the sources of feed and fodder, as about sixty- five percent - seventy percent of the total cost of livestock farming is attributed to feeding (Hegde 2006). Any saving in feed and fodder cost would directly contribute to increase in profitability. Balanced feeding of milch animals is more critical, as the results are reflected within a short span, almost immediately, in the form of milk production. In case of growing stock of bullocks, sheep and goats, quality of feed will reflect on the growth rate, body weight and fertility, which are often unnoticed by the owners (Franzel et al. 2003). Maximization of fodder in the diet of dairy animal makes their ration much cheaper as compared to concentrated based ration (Gaikwad and Gampower 1995). Improved grasses are generally bulky and high yielding crops. They have high residual fertility utilization capacity and provide quick soil cover to land, minimizing soil erosion (Scoones 1992). Some are resistant to nematodes and ideal for use in crop rotations (York and Nyamadzawo 1990). Hence feeding of milch animals has greater significance for farmers, although feed management for other spe-

cies is equally important. According to Dikshit and Birthal (2010), India's livestock sector requires 855 Mt of green fodder, 526 Mt of dry fodder and 56 Mt of concentrates by the year 2020. They predict that these requirements will be met from a basket comprising 27 Mt of cereals, 4 Mt of pulses, 21 Mt of oilseeds based items and 4 Mt of manufactured feed.

Rogers' innovation decision model features five sequential stages: knowledge, persuasion, decision, implementation and confirmation in which the process of decision making takes place. There is empirical evidence that individuals continue to seek information about a given innovation even after adoption. Mason (1962) found that the decision to adopt or reject a new idea is often not the terminal stage in the innovation-decision process and that individuals continue to seek information about an innovation after they have adopted it. Rogers' model features a post-adoption stage, the confirmation stage, also called as continuance stage (Parthasarthy 1995), in which an individual seeks reinforcement of the innovation decision already made. It is at this point that the individual may choose to reverse their previous adoption decision and discontinue the use of the innovation (Miller and Mariola 2008).

Many studies have been conducted on innovation decisions of farmers on food crops. Studies to this effect on perennial fodder crops are meager. Many farmers in India do not come forward to cultivate perennial fodder crops owing to their small land holdings. But then, there are some farmers who cultivate these crops despite being perennial in nature occupying land for long. The benefit of growing these crops is indirect through the sale of animal products like milk. With these typical characteristics the trend for cultivation of perennial fodder crops though is growing in Karnataka. The factors that influence cultivation of these crops on continuing basis needs to be determined to better understand the innovation decision of the farmers. Therefore the present study was conceptualized with the objective to analyze the favorable factors for continuance of perennial fodder crop cultivation by the farmers.

METHODOLOGY

Ex -post facto research design was used for the study and a standardized interview schedule was used for data collection. Dharwad and Belagavi districts of Karnataka state were purposively selected with the consultations of scientists working on fodder crops. Villages were selected based on the criteria of maximum number of fodder growers as enlisted with Indian Grassland and Fodder Research Institute (IGFRI), Dharwad. Kodachwad and Avarolli village in Khanapur Block *(taluk)*, Kallol village in Chikodi *taluk* (Belagavi district); Mansur, Managundi and Tegur villages in Dharwad *taluk*, Kamplikoppa village in Hubli *taluk* (Dharwad district) were selected as study areas. List of farmers cultivating perennial fodder crops in the study area was collected from Southern Regional Research Station, Dharwad of Indian Grassland and Fodder Research Institute (IGFRI). These farmers were contacted initially to collect the data and through them, by using snowball technique other perennial fodder crops growing farmers of the village were contacted to collect the data. Overall, 55 farmers from Belagavi district and 40 farmers from Dharwad district were contacted, thus forming the sample size of 95 farmers.

In the study, continuance is a post-adoption stage, the confirmation stage, in which an individual seeks reinforcement of the innovation decision already made. A "teacher made test" was developed and used to measure the continuance of perennial fodder crops cultivation by the respondents.

A structured interview schedule was prepared inclusive of all the variables identified for the study. This schedule was pre-tested in a non-sample area to locate ambiguity in the questions included. Based on the nature of the responses, necessary corrections were made at different stages so as to standardize the interview schedule. This pre-tested and standardized schedule was used to collect the data in the study area. Data was collected by personal interview technique. Collected data was subjected to path and regression analysis to extract the factors responsible for continued adoption of perennial fodder crops.

RESULTS AND DISCUSSION

Table 1 presents the findings of correlation between continuances of perennial crop cultivation with other independent variables. Among 19 variables subjected for correlation analysis,

Table 1: Correlation coefficient between continuance of perennial fodder crops cultivation and other independent variables

Variables	*Correlation coefficient (r)*
Age	-0.006
Education	0.061
Family size	0.217*
Land holding	0.416**
Size of irrigated land	0.409**
Annual income	0.469**
Herd size	0.513**
Extension contact	0.262*
Extension participation	0.508**
Organization participation	0.381**
Mass media participation	0.295**
Innovative proneness	0.418**
Scientific orientation	0.025
Management orientation	0.389**
Risk orientation	0.336**
Perceived Attributes of Innovation	0.450**
Knowledge level of fodder crops	0.067
Information seeking behaviour	0.230*
Training received	0.474**

**Significant at 1% level, *Significant at 5% level

15 variables exhibited positive and significant relationship with continuance of perennial fodder crops by adopters. Landholding, size of irrigated land, annual income, herd size, extension participation, organization participation, mass media participation, innovative proneness, management orientation, risk orientation, perceived attributes and training received expressed positive and significant relationship with continued adoption at one percent level of probability. Family size, extension contact and information seeking behavior were positively and significantly correlated with continued adoption at five percent level of probability. Bigger the land holding farmers can spare some part of their land for continuous cultivation of perennial fodder crops. Green fodder production from perennial fodder crops throughout the year demands irrigation and hence size of irrigated land showed positive correlation. Income from fodder crops is indirect unlike for grain crops. It is through milk or meat production. Higher income earning farmers can forego their direct income by grain crops by cultivating fodder crops. Requirement for fodder increases as herd size increases. Participation in extension activities, different organizations and mass media creates more awareness about the new crops and their importance to cultivate. This enables the farmers to have more access to knowledge and seed/planting material. Farmers who are in regular contact with extension personnel easily get the planting materials and their participation in farmer's fair (*Krishi Mela)*, demonstrations and exhibitions give them a good exposure and learning situation where the farmers can learn by themselves about the benefits of growing perennial fodder crops, which will in turn boost the farmers to cultivate them. Being members of organizations and co-operatives like Karnataka Milk Federation (KMF), farmers can directly sell their milk produce to KMF, thus reducing the burden of middlemen. Mass media like newspaper, farm journals, radio and television is utilized by farmers to get information on latest high yielding fodder hybrids, technologies pertaining to grow fodder crops and different schemes launched by government to enhance fodder cultivation. Farmers get benefitted from the information they get from friends, relatives and other fodder growing farmers pertaining to technologies related to cultivation of perennial fodder crops. Highly innovative farmers are more likely to adopt new farming technologies and get high fodder yields. Farmers who can manage their farms and take calculated risk will earn higher income by cultivating perennial fodder crops and will be motivated to continue growing them. Perennial fodder crops which are perceived as advantageous in comparison to other fodder crops, which are compatible to existing situations and culture of farmers, can be tried on a small scale, whose yield is observable and which are less complex in nature are continuously grown by farmers. Farmers with big family size can diversify crops due to the availability of family labours. Training imparts knowledge and technical skill which enables the farmers to learn to use the available resources efficiently to get good results.

Table 2 presents the stepwise regression analysis of continuance of perennial fodder crops cultivation with 19 other independent variables. It has been found that four predictor's viz., herd size, extension participation, innovative proneness and perceived attributes of innovation have been retained at the last step of screening. The R^2 being 0.564, it is to infer that all the above 4 predominating predictors have explained 56.4 percent variance embedded with the predicted variable continuance of perennial fodder crops cultivation. These four variables exert critical influence on the decision of continuance of perennial fodder crops cultivation.

Table 2: Stepwise regression analysis of continuance of perennial fodder crops cultivation versus other independent variables

Predictors	*B*	*Std. error*	*Beta*	*T*	*R*	R^2	*Adjusted* R^2	*Std. error estimated*
Age	-0.032	0.149	-0.022	0.212	0.751	0.564	0.447	11.425
Education	-0.529	0.703	-0.088	0.752				
Family size	0.829	1.201	0.070	0.691				
Land holding	0.292	0.380	0.149	0.767				
Size of irrigated land	-0.163	0.753	-0.050	0.217				
Annual income	-4.099	0.000	-0.010	0.037				
Herd size	0.669	0.309	0.270	2.165*				
Extension contact	-0.383	0.400	-0.101	0.958				
Extension participation	1.371	0.649	0.218	2.112*				
Organization participation	-0.103	0.370	-0.044	0.279				
Mass media participation	-0.017	0.183	-0.010	0.092				
Innovative proneness	2.438	1.007	0.301	2.420*				
Scientific orientation	-5.583	3.129	-0.203	1.784				
Management orientation	3.001	1.792	0.161	1.674				
Risk orientation	-1.728	1.145	-0.204	1.510				
Perceived attributes of innovation	1.171	0.460	0.277	2.601**				
Knowledge level of fodder crops	-0.437	0.354	-0.117	1.236				
Information seeking behavior	-0.692	1.278	-0.054	-0.541				
Training received	1.675	3.859	0.053	0.434				

** Significant at 1% level, *Significant at 5% level

Among these four variables, perceived attributes of innovation gives a strong message that it should not be neglected in order to enhance continued cultivation of perennial fodder crops. Farmers with large herd size should be the target group for extension functionaries to increase the area under perennial fodder crops. 'Fodder extension' is not very popular in India. State agricultural departments concentrate on principal grain and cash crops of the region for popularization. State animal husbandry department mainly focuses on clinical aspects of livestock. If farmer has better extension participation by visiting various places then he tends to obtain knowledge on perennial fodder crops. Innovative proneness forms an important component as fodder crops are not traditionally grown and innovative farmers might have tried and continued to adopt them.

Table 3 depicts results of path analysis on continuance of perennial fodder crops cultivation versus other independent variables. Out of 19 variables, 11 variables had positive direct effect and 8 variables had negative direct effect on continuance of perennial fodder crops cultivation. Ranking of variables based on their direct effect on continuance of perennial fodder crops cultivation revealed that, innovative proneness (x12), perceived attributes of innovation (x16) and herd size (x7), occupied first three ranks. These three variables are very important as perennial fodder crops are new crops when compared to their traditional crops with different attributes. Bigger herd size raises the demand for more fodder so it might have expressed direct effect on continued cultivation of these crops. Ranking of the indirect effects indicated that risk orientation (x15) followed by annual income (x6) and size of irrigated land (x5) were the first three important variables which had total indirect effect on continuance of perennial fodder crops cultivation. Any new idea tried for the first time always involves risk of varied nature and quantity. It demands initial investment in terms of labour and planting material. Perenniality of the crop also depends on availability of irrigation so as to grow and produce green fodder throughout the year. Total indirect effect by risk orientation (x15) was channelized through scientific orientation (x13), knowledge level of fodder crops (x17) and organization participation (x10). Better the knowledge level, person will be better prepared to take risk. Scientific orientation of farmers and their participation in organizations might have helped them to gather more knowledge about these crops.

Table 3: Path analysis on continuance of perennial fodder crops cultivation versus other independent variables

Variables	*Total effect*	*Total direct effect*	*Total indirect effect*	*Substantial indirect effect I*	*Substantial indirect effect I II*	*III*
Age (x1)	-0.006	-0.022	0.016	0.046 (x2)	0.020(x6)	0.012(x13)
Education (x2)	0.038	-0.088	0.126	0.056(x17)	0.041(x14)	0.029(x13)
Family size (x3)	0.217	0.070	0.147	0.056 (x4)	0.041(x18)	0.032(x10)
Land holding (x4)	0.392	0.149	0.243	0.081(x10)	0.077(x8)	0.057 (x6)
Size of irrigated land (x5)	0.410	-0.050	0.460	0.127 (x8)	0.123(x4)	0.109(x13)
Annual income (x6)	0.466	-0.010	0.476	0.169 (x8)	0.119(x4)	0.109(x13)
Herd size (x7)	0.514	0.270	0.244	0.111(x13)	0.103(x10)	0.091(x17)
Extension contact (x8)	0.262	-0.101	0.363	0.109(x13)	0.103(x17)	0.063(x10)
Extension participation (x9)	0.508	0.218	0.290	0.127 (x8)	0.122(x13)	0.079(x17)
Organization participation (x10)	0.379	-0.044	0.423	0.166(x13)	0.133(x17)	0.101(x10)
Mass media participation (x11)	0.294	-0.010	0.304	0.146(x13)	0.117(x17)	0.099 (x8)
Innovative proneness (x12)	0.418	0.301	0.117	0.140(x17)	0.099(x8)	0.088(x10)
Scientific orientation (x13)	0.024	-0.203	0.227	0.158(x13)	0.053(x17)	0.042(x15)
Management orientation (x14)	0.389	0.161	0.228	0.116(x17)	0.104(x13)	0.089 (x8)
Risk orientation (x15)	0.336	-0.204	0.540	0.174(x13)	0.154(x17)	0.094(x10)
Perceived attributes of innovation (x16)	0.450	0.277	0.173	0.152(x13)	0.088(x8)	0.067(x15)
Knowledge level of fodder crops (x17)	-0.067	-0.117	0.050	0.059(x13)	0.045(x17)	0.030 (x8)
Information seeking behaviour (x18)	0.230	-0.054	0.284	0.095 (x8)	0.081(x17)	0.061(x13)
Training received (x19)	0.474	0.053	0.421	0.160(x13)	0.127(x8)	0.124(x10)

CONCLUSION

Targeting right group by the extension organizations to increase area under perennial fodder crops is must given the existing organizational setup for it. Results of the study emphatically brought out that herd size, extension participation, innovative proneness and perceived attributes of innovation are the factors needs to be assessed to ensure that perennial fodder crops are adopted and continued for cultivation. Targeting the farmers with these characters would help for effective use of resources by the extension functionaries.

REFERENCES

Dikshit AK, Birthal PS 2010. India's livestock feed demand: Estimates and projections. *Agriculture Economics Research Review,* 23(7): 15-28.

Franzel S, Charles W, Paul T 2003. Adoption and dissemination of fodder shrubs in central Kenya. *Agricultural Research & Extension Network,* 4(2): 131-133.

Gaikwad BM, Gampower AS 1995. Cost of milk production in crossbred cows at agricultural college dairy farm, Nagpur. *Indian Journal of Dairy Science*, 48(1): 607.

Hegde NG 2006. Livestock Development for Sustainable Livelihood of Small Farmers. *39th Annual Meeting and 48th National Symposium on "Emerging Rural India"- A Challenge to Livestock Industry.* Compound Livestock Feed Manufacturers Association of India (CLFMA), 26 August, 2010, Manesar, Haryana, India.

Kannan E 2012. *Economics of Production, Processing and Marketing of Fodder Crops in Karnataka*. Bangalore: Agriculture Development and Rural Transformation Centre, pp. 23-82.

Mason R 1962. *Information Source Use in the Adoption Process*. PhD Thesis, Unpublished. California, USA: Stanford University.

Miller M, Mariola M 2008. The Discontinuance of Environmental Technologies in the Humid Tropics of Costa Rica: Results from a Qualitative Survey. *24th AIAEE Annual Conference on Global Entrepreneurship in International Agricultural and Extension Education*, EARTH University, Costa Rica, pp. 338-349.

Parthasarathy M 1995. *The Impact of Discontinuance of the Subsequent Adoption of an Innovation: Theoretical Foundation and Empirical Analysis*. PhD Thesis, Unpublished. Nebraska, USA: University of Nebraska.

Planning Commission 2012. *Annual Report*. India: Government of India, pp. 32-35.

Rogers EM 2003. *Diffusion of Innovations*. 5th Edition. New York, USA: Free Press.

Scoones I 1992. Land degradation and livestock production in Zimbabwe's communal areas. *Land Degradation Rehabilitation,* 3: 99-113.

York P, Nyamadzawo E 1990. Rhodes Grass Breeding in Zimbabwe: Aims, Achievements, Prospects and Route to Agricultural Applications. *Paper Presented in International Workshop on Utilization of Research Results on Forage and Agricultural by-Products Materials as Animal Feed Resources in Africa*, 5 to 9 December, 1990, Addis Ababa, Ethiopia.

Paper received for publication on August 2016
Paper accepted for publication on December 2016