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RESEARCH PAPER

Risk Perception of Dairy Farmers of Kerala and the Effectiveness of Risk Management Strategies Adopted

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ABSTRACT

The present study looks into farmers perception of risks and effectiveness of major risk management strategies being adopted by dairy farmers of Kerala. Primary data was collected from 226 farmers of Calicut and Malappuram districts. Majority of the farmers opined there was only moderate increase in both production and price during the past five years. Lack of capital, unavailability of inputs on time, high temperature, input price hike, volatility in prices and price policy of government were the major sources of risks perceived by the farmers. Membership in cooperative societies and adoption of value addition were found to be effective strategies for risk reduction. Whereas coping strategies like reduction of spending on management practices when faced with income shock was found not effective as it leads to long term negative effects. The study stressed on the need for awareness creation and further support measures for risk management and for continuing with proper adoption of recommended management practices.

HIGHLIGHTS

- Lack of capital, unavailability of inputs on time, high temperature, input price hike and volatility in prices were the major sources of risks as perceived by the farmers.
- Membership in dairy cooperatives and adoption of value addition were found as effective risk reduction strategies for dairy farmers.

Keywords: Dairy cooperatives, Risk management strategies, Risk perception, Value addition

Dairy farming is an important livelihood activity for a number of farmers in Kerala. Compared to many other states, majority of livestock population in Kerala are crossbreds. Crossbred cows contribute more than 90 percent of total milk production in Kerala. Also, livestock possession in Kerala is highly skewed towards marginal and small farmers. There are a number of challenging factors for dairying in the state – like year-round hot and humid climate, scarcity of fodder, high rainfall and consequent mineral depletion from the soils, etc. Yet, through successful cattle development programmes, the state could significantly improve milk yield of cattle in the state (GoK, 2017).

Kerala succeeded in implementing the cattle development programmes by making majority of cattle population into crossbreds and thus improvement in milk yield. But, along with improvement in yield, it necessitated more care, scientific management practices and external inputs also. Compared to the local breeds, crossbred cattle are highly vulnerable (GoK, 2016). Farmers face a number of risks in dairy farming. Production risk, price risk and income risk may emerge from diverse factors like change in climatic factors, supply-demand imbalance in the market, lack of capital, lack of availability of inputs on time, price

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hike of inputs, etc. Though per cattle milk yield is improved, and cooperative societies are procuring milk and giving higher price compared to many other states, many of the small and marginal farmers are finding it difficult to get a good and stable return in a continuous manner. Various risks involved in dairy farming is a major cause for this. In the absence of proper awareness and understanding of various risks involved, and also about effective risk management mechanisms, farmers won't be able to overcome this successfully. It is pertinent to know how farmers perceive various risk factors. Their perceptions will have major role in deciding future course of actions and selection of strategies to manage these risks. Farmers might be adopting various measures in order to minimize or cope up with risky situations. It is important to see how effective these adopted risk management measures are. In this backdrop, the present study looks into the risk perception of dairy farmers in Kerala and the effectiveness of various risk management strategies being adopted by them.

MATERIALS AND METHODS

Present study is based on primary data collected from farmers of Calicut and Malappuram districts of Kerala. Multi stage sampling procedure was followed. Districts were selected owing to sufficient number of dairy cooperative societies functioning. Three villages from each district were selected after discussion with officials. Respondents were selected after satisfying multiple criteria like – members and non-members of cooperatives, those who were doing value addition and not, etc. Primary data was collected through personal interview method from a total of 226 dairy farmers using a structured pre-tested interview schedule.

Farmers' perception of risk: Percentage and tabular analysis were used to analyze farmers' perception of risks (reflected through incidence of risk events). Farmers were asked about the risk events during past five years, and its occurrence and intensity were recorded.

Efficacy of risk management strategies adopted by farmers

Major strategies adopted by farmers for risk reduction / risk coping were identified through discussion with farmers. The strategies selected were 1) membership in dairy cooperative societies 2) production and sale of value-added products, and 3) stop spending on management practices when faced with risks. Following Yang (2010), logistic regression analysis was used for assessing the effectiveness of selected management practices. Since the response variable was not binary in the present study context, and were with specific order, we have used ordered logistic regression instead of binary logit. Response variable used was trend in income from dairy farming during the past five years in presence of risks.

The empirical model used is:

$$INC = \beta_0 + \beta_1 DCM + \beta_2 VA + \beta_3 SSM + \beta_4 IG + \beta_5 AGE + \beta_6 EDU + \beta_7 MME + \varepsilon$$

Where, *INC* = Income change over years (1: increasing, 2: no change, 3: decreasing), *DCM* = Dairy cooperative membership (1 for member, 0 otherwise), *VA* = Value addition (1: Always, 2: Very often, 3: Cautious, 4: Seldom, 5: Never), *SSM* = Stop spending on management practices when income risk occurs (1: Always, 2: Very often, 3: Cautious, 4: Seldom, 5: Never), *IG* = Income group (I for APL, 0 for BPL), *AGE* = Age of the farmer in years, *EDU* = Years of education of the farmer, *MME* = Mass media exposure score

RESULTS AND DISCUSSION

Socio-economic characteristics of farmers may have influence on their perceptions and decisions. Among the 226 dairy farmer respondents, around 66 percent were members and 34 percent were non-members of dairy cooperatives. 51.33 percent of the farmers opined their income was increasing over time whereas 35.40 percent farmers told their income decreased over the time. Mean age of the farmers was 56.48 years and on an average they had 8 years of education and a mass media exposure score of 3.47. Nearly 42.04 percent farmers always practiced value addition, while another 26.11 percent never done that. Similarly, 18.58 percent farmers opined they always stopped spending on costly management practices whenever they face income shocks and it became uneconomical to spend more money. Whereas 47.35 percent farmers made it clear that they never stopped spending on management practices in whatever situations.

Table 1: Socio-economic characteristics of the sample farmers

Variable		Frequency
Number of respondents		226 (100.00)
Mean age		56.48
Mean education		8.12
Mean mass media exposure		3.47
Income group	BPL	77 (34.07)
	APL	149 (65.93)
Farm income trend for past 5 years	Increasing	116 (51.33)
	No change	30 (13.27)
	Decreasing	80 (35.40)
Cooperative membership	Member	150 (66.37)
	Non-member	76 (33.63)
Value addition	Always	95 (42.04)
	Very often	31 (13.72)
	Cautious	22 (9.73)
	Seldom	19 (8.41)
	Never	59 (26.11)
Stop spending on management practices in case of income risk	Always	42 (18.58)
	Very often	20 (8.85)
	Cautious	34 (15.04)
	Seldom	23 (10.18)
	Never	107 (47.35)

Note: *Figures in parenthesis indicate percent to total.*

Farmers' perception of risks in dairy farming

While looking at the micro level perspective, farmers' perception of various risk parameters will be of immense use. It plays a crucial role in adaptation process (Sautier *et al*. 2017). Farmers' response regarding trend in production and price for the last five years were asked and is presented in table 2. Farmers' perception regarding occurrence of production risk, price risk and income risk are presented in tables 3, 4 & 5. Farmers were asked about the intensity of each event as low, medium and high, if they faced it in last five years and the frequency percentages are presented.

Farmers' perception of trend in production and price over the years

When asked about their perception on trend in production and price of milk during the past five years, 37 percent farmers reported increase in milk production and 41 percent farmers reported moderate increase. Similarly, around 66 percent farmers claimed moderate increase in the prices during this period, while 33 percent farmers reported decent increase in price of milk. A small percent (1.33%) farmers were perceiving stagnancy in price. Likewise, around 4 percent farmers opined there was no change in milk production level whereas many (16.33%) farmers perceived moderate decrease in milk production, and a few (1.33%) farmers perceived significant decrease also.

Table 2: Farmers' perception of production and price trend over time

Trend	% respondents	
	Production	Price
Increasing	36.73	32.74
Moderately increasing	41.15	65.93
No change	3.98	1.33
Moderately decreasing	16.37	0.00
Decreasing	1.33	0.00

Farmers' perception of production risk

Farmers' perception of occurrence of production related risks is presented in table 3.

Table 3: Farmers' perception of occurrence of production risk

Risks	% respondents affected			
	Never	Low	Medium	High
High temperature	48.23	1.77	23.01	26.99
Drought	46.90	2.21	29.65	21.24
Rainfall inadequacy	47.79	3.98	34.51	13.72
Rainfall untimeliness	68.14	26.11	4.42	1.33
Pest/ disease attack	38.05	23.01	32.30	6.64
Lack of technology	37.61	41.15	19.91	1.33
Lack of technical know how	48.67	32.74	16.37	2.21
Inadequacy of inputs	26.55	23.89	34.96	14.60
Untimeliness of inputs	28.32	18.14	23.01	30.53
Lack of capital	43.81	2.65	11.06	42.48

Lack of financial capital was the most frequent and severe issue faced by most of the dairy farmers in the study area (42.48%). This was followed by untimeliness of inputs (30.53%), high temperature (26.99%) and drought (21.24%). Lack of financial capital constrain them in adopting better management practices, and this leads to future income losses also. Many farmers were complaining about lack of availability of fodder on time. This

was putting them into troubles and thus perceived as a frequent risk. Shortage of fodder in the state is reported as an important issue in many studies (Sreeram *et al*. 2018; Smitha *et al*. 2019). This issue was mostly faced during the summer months. Out of the total green fodder requirement of 87 LMT per annum, the availability in the state is only 40 LMT per annum (GoK, 2022). High temperature and drought affect dairy cattle in multiple ways like diseases, yield decline, lack of availability of enough fodder materials and water, etc. Thus, these were perceived as frequent issues by many farmers.

Farmers' perception of price risk

Farmers' perception of price related risks is presented in table 4. Input price hike was the most frequent issue faced by dairy farmers. More than 88 percent farmers reported they faced risk of input price hike. When looked into severity, it was found that more than 35 percent farmers perceived the severity as high, 25.66 percent farmers perceived medium severity and 26.55 percent farmers perceived low severity.

Table 4: Farmers' perception of occurrence of price risk

Risks	% respondents affected			
	Never	Low	Medium	High
Lack of marketing information	61.95	26.99	10.18	0.88
Input price hike	11.95	26.55	25.66	35.84
Failure of institutions	82.30	9.73	7.96	0.00
Over supply in the market	93.36	4.42	1.77	0.44
Substitute products	82.74	16.81	0.44	0.00
Change in food habits	64.16	32.30	3.54	0.00

Though output price is increasing, it is not catching up with the rate of increase in input prices and thus resulting in income loss to the farmers. Concentrate feed price was the most referred input, price of which increased drastically over the years. Antony *et al*. (2022), Patil *et al*. (2022), Smitha *et al.* (2019) and Sreeram *et al.* (2018) also reported high price of cattle feed as a major constraint faced by dairy farmers in Kerala. The share of concentrate in total feed is more than 60 percent in Kerala (Anand, 2022). Hence price hike of concentrate feed will hamper profitability of dairy farms in the state quickly.

Farmers' perception of income risk

Volatility in input prices was the most important issue reported by dairy farmers (22.57 percent). Feed prices were shooting up and it was affecting their income in a big way. This was followed by price policy by the government (21.68 percent), fluctuations in production (18.58 percent) and subsidy policies (13.72 percent). Damage of products was not seen as a major issue by most of the farmers. Though dairy cooperatives in Kerala provide high milk purchase price compared to cooperatives in most other states, farmers feel this price should be further increased – as cost of production is significantly higher in Kerala, compared to other states (Gok, 2022). Also, they feel the expenses on inputs must be further subsidized so as to make dairy farming profitable.

Table 5: Farmers' perception of occurrence of income risk

Risks	% respondents affected			
	Never	Low	Medium	High
Price policy of the Government	44.25	12.83	21.24	21.68
Volatility in input prices	14.16	29.20	34.07	22.57
Subsidy policies	53.10	11.06	22.12	13.72
Fluctuations in production	6.64	27.88	46.90	18.58
Damage of products	94.25	3.98	1.33	0.44

Efficacy of risk management strategies adopted by dairy farmers

Efficacy of different risk management strategies adopted by farmers was studied using ordered logistic regression. Farm income change over years in presence of risks was recorded for the farmers as (1) increasing, (2) no change, and (3) decreasing. These responses along with a number of independent variables comprising farmer specific characteristics and adoption status of identified risk management strategies were then incorporated into an ordered logistic regression model.

Risk management strategies can be divided into ex-ante and ex post strategies- depending on whether the reaction to risk takes place prior to the occurrence of the event or after the event has occurred. The ex-ante mechanisms try to reduce

risk, whereas ex-post mechanisms help to cope up with risk and smoothen income, consumption, etc. Major risk management strategies considered for the study were (1) membership in dairy cooperatives, (2) adoption of value addition, and (3) stop spending money on management practices while faced with income risk.

Dairy cooperatives are well-structured farmer collectives for the benefit of dairy farmers. It is providing number of benefits to its members. Thus it is expected to protect its member farmers from risky situations. Value addition is another major strategy being adopted by farmers. This helps them to deal with supply-demand imbalance, unremunerative price for raw milk, etc. When faced with risky situations leading to income loss, many farmers were found limiting the money spend on management practices as a coping mechanism.

From the results of ordered logistic regression analysis (Table 6) it was found that membership in dairy cooperatives, and value addition of products significantly helped the farmers in keeping their income increasing over years by overcoming various hardships and risk factors.

Table 6: Efficacy of risk management strategies adopted by farmers: ordered logistic regression

Variable		Coefficient	Std. Error
Membership in Cooperatives		-0.90806**	0.42397
Value addition of products	Always	-3.82440***	0.56558
	Very often	-1.78867***	0.58009
	Cautious	-1.60988***	0.63295
	Seldom	-1.54204***	0.62633
	Never	(base)	(base)
Stop spending on management practices	Always	3.72321***	0.74120
	Very often	1.18304**	0.59284
	Cautious	0.23108	0.48857
	Seldom	0.28302	0.53551
	Never	(base)	(base)
Income group		0.21060	0.38984
Age		0.00904	0.02989
Education		0.13086	0.09989
Mass media exposure		-0.04832	0.13995
Log likelihood: -131.48, LR Chi^2: 179.09, Prob>Chi^2: 0.00			

Note: ****, ** and * denote significance at 1 percent, 5 percent and 10 percent levels respectively.*

Bayan (2018) also had found that membership of dairy cooperative societies in Assam contributed towards improving yields of dairy animals, farm income and employment. Cooperative societies provide a number of services to the member farmers. Good quality cattle feed at low rate, supply of mineral supplemeents, technical guidance, fodder, assured marketing facility for member farmers, etc. These interventions might be helping farmers to fetch higher income in a continuous manner and also to cope up with risky situations.

Dairy cooperatives in Kerala have a three-tier structure comprising dairy cooperative societies at the bottom most level, which unite to form unions and then federation at the apex level. 'Kerala Cooperative Milk Marketing Federation Ltd. (KCMMF)' is the apex dairy cooperative in the state, below which there are three unions representing north, central and south Kerala, and then a number of societies at the bottom. KCMMF through its societies collects milk from the member farmers, process it and sell packaged milk and milk products under the well-known brand name 'Milma'. Thus farmers get benefitted through an assured market, and also the price provided by dairy cooperative societies to the farmers is best in the country. Farmers were able to get higher price while selling to domestic customers directly, even then they are interested to be members of dairy cooperatives and hence they are strictly supplying a good share of the total milk produced to the societies. Assured market is the major attraction for farmers. Apart from this, they are getting quality cattle feed and mineral supplements at reasonable rate whenever they need. Also, they are getting financial support and bonus which is an added advantage.

Apart from cooperative membership, value addition also was found to help farmers to keep their farm income increasing over years. Price difference between raw milk and value added products is significant (Kaur *et al.* 2022). Higher share of consumer price can be received through production and sale of value added products. Also, compared to raw milk these products have more shelf life. Curd and Ghee were the most common products made by most of the farmers. Many farmers were limiting money spend on management practices when faced with risks leading to income loss- as a risk coping strategy. But this was found to have negative effects

in the long-run. Those who always or very often restrict money being spent on management practices during unremunerative production scenarios were found to face significant reduction in farm income over years compared to those who never stopped spending on management practices.

Analysis of marginal effects presents a more clear picture (Table 7). Being a member of dairy cooperative is associated with being 11 percent more likely to be in increasing income status, 2.0 percent less likely to be in stagnant income status and 9.0 percent less likely to be in decreasing income status compared to non-members. Thus it came clear that dairy cooperatives played important role in managing risks and to help dairy farmers to achieve a stable income.

All the four categories of adoption of value addition gave significant results. Those who always prepare value added products were found 60 percent more likely to report increasing income, 7 percent less likely to be in stagnant income and 53 percent less likely to be in decreasing income category compared to those who never adopted value addition. Similar trend was seen for all other three scenarios of value addition adoption (those who adopt value addition very often, cautious or seldom) while considering the increasing or decreasing income situations; but the magnitude of incremental possibilities for being in increasing income category or less likely to be in decreasing income category was found to come down as we move from those who do value addition always to those who do it seldom. Those who always do value addition were found 60 percent more likely to report increasing income compared to those who never do value addition, whereas those who seldom adopt value addition were found only 24 percent more likely to be in increasing income category compared to those who never do value addition. Similarly, those who do value addition always were found 53 percent less likely to be in decreasing income category; whereas those who seldom adopt value addition were found only 27 percent less likely to be in decreasing income category compared to those who never do value addition. Preparation and marketing of value-added products is a better way to climb up in the marketing channel and to fetch a higher share of the profit for the farmers. In most times raw products are getting less price and maximum profit is being taken by those who make value added products from these and market. Hence it is imperative for the farmers to take up this role so as to fetch higher income which in turn will enhance their risk management ability. In this way value addition might be helping farmers to enhance their income over time.

It is often seen that farmers stop spending on management practices when returns are not

Table 7: Marginal effects of ordinal logistic regression

Variable		Income Increasing	No change in income	Income Decreasing
Membership in Cooperatives		0.10737**	-0.01992*	-0.08746**
Value addition of products	Always	0.60405***	-0.07212**	-0.53194***
	Very often	0.29075***	0.02557	-0.31631***
	Cautious	0.25712***	0.03194	-0.28906***
	Seldom	0.24438**	0.03395	-0.27832***
	Never	(base)	(base)	(base)
Stop spending on management practices	Always	-0.49910***	-0.03332	0.53241***
	Very often	-0.17688*	0.01726	0.15963*
	Cautious	-0.03380	0.00491	0.02889
	Seldom	-0.04147	0.00591	0.03556
	Never	(base)	(base)	(base)
Income group		-0.02490	0.00462	0.02028
Age		-0.00107	0.00020	0.00087
Education		-0.01547	0.00287	0.01260
Mass media exposure		0.00571	-0.00106	-0.00465

Note: ****, ** and * denote significance at 1 percent, 5 percent and 10 percent levels respectively.*

adequate. Effect of this farmer behavior on long-term income trend was also studied. It was found that, those who always stop spending on management practices when met with some income-losses were 50 percent less likely to be in increasing income category and 53 percent more likely to be in decreasing income category. Similarly, those who stop management practices very often when met with some income-losses were 18 percent less likely to be in increasing income category and 16 percent more likely to be in decreasing income category. During income loss, many farmers may stop spending on costly management practices, and many times its effect might come visible in the future only. This might be causing stagnant/ decreasing income over years for many farmers. Thus, they will become more vulnerable and hence won't be able to cope up with risky situations.

CONCLUSION

Among the various sources of production, price and income risks, the major sources of risks as perceived by farmers were lack of capital, unavailability of inputs on time, high temperature, input price hike, volatility in prices, price policy by government etc. Membership in dairy cooperative societies and adoption of value addition were found as effective measures for managing risks and thus to assure better income over years. But risk coping strategy like stop spending on management practices when faced with risk was found to be not effective in the long-run. More awareness creation programmes are needed for managing risks and to ensure a stable income for dairy farmers. Though strategies like cooperative membership and value addition were found effective, many farmers are not utilizing its benefits. There might be a number of reasons behind this, like lack of awareness of its benefits, lack of access, lack of support system, etc. Measures are needed to identify these factors and help maximum farmers to get benefitted by effective risk management strategies. Proper support measures are needed to ensure farmers are able to adopt all the recommended management practices even when faced with risky situations. Measures like distribution of feed and other inputs on credit during such tough times, providing assured price and market, etc. may be helpful.

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