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Determinants of Milk Producers Participation in Marketing Channels in Prakasam District of Andhra Pradesh State, India

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A B S T R A C T

Milk production is the most important agricultural activity in the Indian agricultural sector. India has achieved tremendous growth in milk production during the last three decades. The study was undertaken with the objective of factors influencing dairy farmers to choose the particular milk marketing channel. A study was conducted in Prakasam district to identify the factors influencing the dairy farmers. Data analysis using multinomial logistic regression model revealed that average price of milk, distance to the marketing channel and training facilities showed a significant impact on type of channel chosen by the dairy farmer.

Introduction

From the chronic shortages of milk, India has emerged as the largest milk producer in the world crossing during the period 1950-51 to 2014-15, has increased from 17 Mt to 146.3 Mt (http://dahd.nic.in/). Dairy activities traditionally been integral to India's rural economy and have been emerging as one of the fast growing sectors of the country. Dairying has become an important secondary source of income for millions of rural families and has assumed the most important role in providing employment and income generating opportunities particularly for marginal and women farmers. Prakasam (0.873 Mt) is the highest milk producing district in A.P. But more and more farmers are selling their old infirm cattle in the market due to severe fodder shortage in drought hit Prakasam district during 2015-16. Cooperative and non-cooperative dairies were involved in marketing and distribution of milk and milk products in Prakasam district. Since Indian dairy industry, particularly the cooperative sector, has a long and successful history of linking smallholder milk producers with markets. It is important to understand farm-level impacts of changing dairy market structures in India. It has also identified the

factors that determine the growth and development of livestock sector in the region. This study is likely to help in developing appropriate measures for enhancing the growth of dairy sector in the region on a sustainable basis.

Materials and Methods

The study was conducted in Prakasam district which was purposively selected for the research study as it is the highest milk producing district in Andhra Pradesh with a total milk production of 0.873 Mt during the year 2014-15. Four mandals and two villages from each mandal were selected purposively based on their highest milk production making a total of eight villages in the district for sampling units. A total of 80 farmers from each village were selected out of which, 20 farmers selling milk to cooperative society i.e. Ongole dairy identified in the district and remaining 60 farmers to non-cooperative dairies which includes traditional, private and milk collection centres were selected. Milk collection centres are setup by a single farmer where milk was collected from different dairy farmers in the surrounding areas. The information on the socio-economic characteristics of the respondents was collected with the help of structured interview schedule.

So, for analysing the factors influencing dairy farmers to choose the cooperative and non-cooperative channel, multinomial logistic regression model was employed because this model fits multiple discrete choice variables. The econometric approach used is two-step procedure with channel choice first and then model the correlate behaviours with endogenous stratification of the sample into the channel strata, controlling for the conditional probability of inclusion in a given channel. In the sample selected, cooperative dairy farmers did not sell raw milk in non-cooperative channels and vice-versa. In non-cooperative channels also, traditional members did not sell raw milk to private and MCC, private dairy farmers did not sell to traditional and MCC channel and MCC channel members did not sell to other channels. The multinomial regression analysis was done using STATA software. Multinomial logistic regression is used to model nominal outcome variables in which log odds of the outcomes are modelled as a linear combination of the predictor variables. The first stage market channel choice is specified as per equation (Greene, 2007. Econometric Analysis).

$$M_{ij} = \beta_j X_i + \varepsilon_{ij}$$

Where,

M_{ij} is a vector of the marketing choices (j = 0 for cooperative society, 1 for private dairy, 2 for MCC and 3 for traditional),

β_j is a vector of channel specific characteristics and ε_{ij} is the random-error estimation.

X_{ij} is a vector of producer characteristics that together influencing dairy farmer market channel decision and the variables were given as

$$M_{ij} = b_0 + b_1 X_1 + b_2 X_2 + b_3 X_3 + b_4 X_4 + b_5 X_5 + b_6 X_6 + b_7 X_7 + b_8 X_8$$

M = Cooperative society (0), Private dairy (1), MCC (2), Traditional (3)
X1 = Household size (≤ 3:0, 4-5:1, >5:2)
X2 = Milk Price (Rs. /lit)
X3 = Distance (km)
X4 = Production cost (Rs.)
X5 = Education (illiterate-0, literate-1)
X6 = Herd size (≤2:0, >2:1)
X7 = Experience-years (≤20:0, 21-25:1, >25:2)
X8 = Training facilities (yes=1, no=0)

The dependent variable (M) selected is a multinomial type i.e. having more than two sets which includes cooperative members and non-cooperative members (traditional, private and MCC dairy farmers).

Results and Discussion

The estimates of first-stage channel selection results of multinomial logit coefficients and marginal effects of market channel choice were represented in table 2. While these factors have facilitated access to market, their effects are similar among different types of milk producers. For comparing both cooperative and non-cooperative channels, cooperative market channel was chosen as the base category and all the coefficients on that channel were set to zero.

The multinomial logit regression analysis was used to estimate the factors that influence farmer's choice of milk marketing channel. Since coefficients are not directly interpreted, marginal effects were also estimated to express the probability of change in milk marketing channel choices as a function of each explanatory variable. From table 2, it can be observed that selling price of milk per litre showed positive significance in case of private channel, milk collection centres and traditional channel. The findings were similar with Berem *et al.,* (2015).

Average price of milk significantly determined the probability of farmer participation in private, MCC and traditional where it had a positive effect (ME = 0.06 for private, ME = 0.02 for MCC and ME = 0.04 for traditional channel). Average milk price received by dairy farmers in traditional channel was more i.e. Rs. 47.30 per litre compared to others in non-cooperative and cooperative channels, holding all other variables in the model at their means.

Distance to their selected channel was negatively related with MCC and traditional channel participation, however it's influence was insignificant in case of private channel. It could be observed that as distance increases, farmers tend to shift to the nearby milk markets. Similar findings were observed by Sharma, 2009 concluded that distance is negatively related with modern market channel participation.

Distance to their selected channel significantly determined the probability of farmer participation in cooperative and non-cooperative channel where it had a positive and negative impact (ME = 0.11, ME = 0.02 and ME = 0.68 for private, MCC and cooperative society respectively which showed positive impact, where in one of the non-cooperative channel it showed negative impact i.e. ME = -0.18 for traditional channel), holding all other variables in the model at their means. With one kilometre increase in distance the probability of a farmer to choose the marketing channel was 11 %, 2 % and 68 % respectively.

Training facilities provided by the government sector also influenced the farmers to choose the particular marketing channel. There has been a positive significant impact in all the channels, but more in case of private with less standard error followed by milk collection centre and traditional channel. This can be interpreted that the trainings attended help the farmers to make a choice of better marketing channel. Similar results were confirmed in the study of Mutura *et al.,* (2015) stated that there was a positive relationship between choice own distribution marketing channel and access to information over marketing cooperatives.

Training facilities significantly determined the probability of farmer participation in cooperative and non-cooperative channels

where it showed a positive impact i.e. ME = 0.18, 0.08, 0.27 and 0.30 for non-cooperative channels which includes private, MCC and traditional channel and cooperative channel respectively, holding all other variables in the model at their means. By providing training facilities the probability of farmers to participate in the training activities were 18 %, 8 %, 27 % and 30 % respectively (Table 1 and 2).

Table.1 Variables for the marketing channel choice model

Variable	Unit	Type of variable
Marketing channel choice	Cooperative, Private, MCC & Traditional	Multinomial (0, 1, 2 and 3)
Average price	Rs./litre	Continuous
Distance to the preferred channel	Km	Continuous
Production cost	Rs./month	Continuous
House hold size	≤ 3:0, 4-5:1, > 5:2	Discrete
Herd size	≤2:0, >2:1	Discrete
Education	illiterate-0, literate-1	Discrete
Dairying experience	≤20:0, 21-25:1, >25:2	Discrete
Training	Yes- 1 and No- 0	Discrete

Table.2 Multinomial logit estimates and marginal effects of choice of milk marketing channel

Variable	Multinomial logit estimates			Marginal effects			
	Private	**MCC**	**Traditional**	**Private**	**MCC**	**Traditional**	**Ongole dairy**
Average price (Rs.)	0.30* (0.15)	0.45* (0.18)	1.02* (0.27)	0.06	0.02	0.04	-0.50
Distance (km)	0.17 (0.33)	-1.09* (0.42)	-3.59* (1.20)	0.11	0.02	-0.18	0.68
Production cost (Rs.)	-0.03 (0.03)	0.01 (0.04)	0.00 (0.05)	-0.00	0.02	-0.00	-0.00
House hold size	-0.22 (0.65)	0.70 (0.75)	1.66 (1.04)	-0.05	0.24	0.74	-0.04
Herd size	1.71 (1.33)	1.44 (1.20)	1.32 (1.44)	0.13	0.59	0.00	-0.19
Education	0.20 (0.79)	-0.25 (0.87)	-1.31 (1.35)	0.05	0.01	-0.07	0.00
Dairying experience	0.42 (0.56)	0.29 (0.62)	0.94 (0.77)	0.03	-0.23	0.04	-0.04
Training	2.57* (0.97)	2.32* (1.01)	2.50* (1.31)	0.18	0.08	0.27	0.30
Constant	-14.85	-20.28	-43.40	-	-	-	-
N = 80, pseudo R^2 = 0.4168, log likelihood = -64.677358, LR chi^2 (24) = 92.45, Prob > chi^2 = 0.000							

Note: Co-operative society used as base category
*denotes significance at 5% LOS
 Figures in parentheses indicates standard error

In conclusion, the traditional milk markets being still dominant in India, policies that engage with and improve these marketing channels mainly in terms of milk quality and safety, are likely to be most appropriate for small scale milk producers, milk market agents and consumers. Reducing transaction costs (through institutions), improving milk quality and safety through training and extension programmes for dairy farmers and improving milk marketing infrastructure are critical for capacity building of smallholder milk producers to compete in the market place and with large-scale producers.

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