Influence of Institutional Credit on Livestock Ownership and Adoption of Cross Bred Technology in Mountainous Regions of Jammu & Kashmir

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Paper Received on December 23, 2015, Accepted on February 11, 2016 and Published Online on March 30, 2016

ABSTRACT

Motivated by non-availability of empirical evidences on determinants of livestock holding, this paper investigated livestock ownership and adoption of cross bred technology in relation with institutional agricultural credit in different agro-climatic zones of Jammu & Kashmir state. The study established that borrowers of institutional credit were better placed to invest more on livestock capital and were able to manage more animals at their farms. Additionally, higher proportion of livestock specie of borrowers was cross bred, implying a crucial role of institutional credit in livestock development. The regression estimates confirmed that institutional credit have significantly contributed to more livestock ownerships. Literacy of family heads, average holding size and irrigated area were other significant determinants of livestock ownership across different agro-climatic zones. Results of the study suggested the need to enhance institutional credit, specific for the purpose for livestock development, in view of increasing demand of livestock and their products in the state.

Keywords: *Institutional credit; Livestock ownership; Cross bred animals; Mountain agriculture;*

Driven by sustained economic growth and rising income, there is a structural shift of consumption pattern in favour of livestock products both in rural and urban areas (*Kumar, 1996, Gandhi and Mani, 1995*). The income elasticity of demand for livestock products is high especially for certain wealth groups in rural areas (*Mehta et al., 2003, Kumar, 1998*) and expectedly the robust growth in the livestock sector is likely to continue (*Delgado et al., 1999 and Parthasarathy Rao et al., 2004*). In view of rich interaction between crop-livestock it is realized that integrating livestock in a system approach would arrest the sustainability concerns of country's food security (*Sere and Steinfeld 1996, Hann et al., 1997, Patel, 1993, Singh et al., 2005*).

The development of livestock sector like any enterprise are determined essentially by the level of technology and the efficiency of market mechanism, however, it is the use of capital that makes these two factors operational. Since livestock forms an important component of farm capital formation, therefore, the financial factor is expected to govern its ownership and adoption of cross bred technology. The livestock domestication is very labour and capital intensive that discourge farmers to manage large herd of animals at their farms. Therefore, the adequacy of individual farmer's financial resources has to be augmented from external sources for efficient and scientific management of livestock. There are wide disparities in the disbursement of institutional credit to agriculture across different regions that correspond to varying performance of agriculture across these regions of the country (Baba *et al*., 2012). Since mountains provide entirely different environment to livestock due to various specificities, therefore, it is imperative to examine the ownership of livestock and adoption of cross bred animals in relation with institutional credit in a hill state like J&K.

The livestock population in the state was about 11 million, of which 31 per cent was cattle and 38 per cent

was sheep population (*Livestock Census, 2007*). The livestock sector in the state has made a stride in intensification, (*Baba et al., 2011a*), however, state still imports over 4 lakh live sheep and goats to meet its growing demand of meat. This emphasized upon development of this sector and increased adoption of improved breeds. In this backdrop, the present paper intends to investigate the ownership of livestock as influenced by institutional credit across different agro-climatic zones of Jammu & Kashmir (J&K).

METHODOLOGY

The study is based upon primary data collected for a UGC sponsored major research project, "Study of rural credit and its impact on agricultural growth and sustainable livelihood in J&K". The data were collected from 400 sample respondents (200 borrowers and 200 non-borrowers of institutional loan) selected through multistage random sampling technique equally from four different agro-climatic zones of J&K by using structured survey schedule (*Baba et al., 2012*).

To ascertain the influence of institutional credit to farming and other socio-economic variables on the ownership of livestock, multiple linear regression of the following structural form was formulated and estimated:

Y= f (CRD, AHS, IRA, FMS, LIT, AGE, U)

where,

Y = Livestock possession (Adult cattle unit/farm),
CRD = Amount of credit advanced (Rs/farm),
AHS = Size of operational holding (kanal),
IRA = Percentage area irrigated (%),
FMS = Average family size (No.),
LIT = Literacy level of the head of the family (0 for illiteracy, 1 for primary, 2 for middle, 3 for secondary, 4 for higher secondary and 4 of higher education level, resp.),
AGE = Age of head of the family (in years), and
U = Error term

There appears a considerable variation across different agro-climatic zones with respect to holding size and intensification of livestock as a response to diverse scenario of altitude, rainfall, temperature, land availability, etc. In addition, a number of socio-economic factors could also be important determinants of livestock holding. The exogeneous variables were specified in the model on the basis of their expected impact on the farmers' ownership of livestock. Among specified variables, the capital position of farmers is one of important determinants of size of livestock holding. The supplementation of finance from external sources, especially from institutions would persuade farmers to invest on productive technologies. The operational holding (OH) is the major determinant and indicator of asset possession (*Bhatia et al., 2004 and Sharma, 2004*). The quality of land represented mostly by the extent of irrigation reflects the cropping potential and hence availability of crop residues/stubbles as fodder. The family size is an indicator of potential household labour availability for livestock rearing. Literacy is an indicator of human capital formation that determines technology sensitiveness and as such is expected to influence livestock ownership parameters. In this context, we hypothesize that (i) the size of livestock holding increases with the increase in the size of operational holding, (ii) size of livestock holding increases with the increase in the quality of land (percentage area irrigated), (iii) size of livestock holding increases with increase in the farm family size, (iv) size of livestock holding may decrease with the age of farmer (v) size of livestock holding increases with increase in the level of education, and (vi) increase with the increase in credit advanced to the farm households.

The empirical evidence of relationship between livestock and various socio-economic variables in the state appears to be scanty; therefore, an attempt was made in this paper to examine the factors affecting ownership of livestock by farmers and to ascertain the influence of institutional credit.

RESULTS AND DISCUSSION

Few socio-economic indicators in different agro-climatic zones : A cursory glance at Table 1 exhibited that borrowers of institutional credit under all agro-climatic zones were having relatively larger land holdings and more area under plough as compared to non-barrowers. The average size of operational holding was found higher under sub-tropical zone (SBTZ) compared to other agro-climatic zones in the state and it was lower in temperate zone (TMZ). Farms in SBTZ are relatively more endowed with water resources that resulted in more intensification of cropping in this zone. Lower proportion of operational area that has irrigation facilities in TMZ have encouraged farmers to cultivate less water intensive apple crop on

Table 1. Land utilization pattern of sample farm households in different agro-climatic zones

Particulars	IMZ		SBTZ		CAZ		TMZ	
	B	NB	B	NB	B	NB	B	NB
Cultivated area (kanal)	8.75	7.1	43.2	20.3	18.0	12.6	29.7	11.04
Cultivated area irrigated (%)	29.0	44.0	98.6	98.9	99.8	93.8	34.8	49.8
Total holding (kanal)	9.03	7.5	44.3	20.9	20.7	14.2	31.35	11.42
Average family size (No./family)	5.7	6.7	7.5	5.7	5.5	5.8	9.4	6.4
Age of family head (years)	39	44	53	54	42	48	51	51
Literate family head (%)	97.8	80.0	88.0	76.0	100.0	94.0	65.4	51.4
Sex ratio	977	835	974	926	1030	858	819	904
Agricultural workers (%)	69.2	62.0	78.97	80.77	61.1	77.0	85.3	73.9

B = Barrowers, NB = Non-barrowers, SBTZ = Sub-tropical zone, IMZ = Intermediate zone,
CAZ = Cold-arid zone, and TMZ = Temperate zone

major proportion of operation area.

Farm family head may be an entrepreneur, a farm manager, above all a decision maker and his level of education would be his strength. Table 1, depicted that higher percentages of heads of farm families were illiterate on non-borrower category under all the agro-climatic zones. Age determines length of experience but aged person may have less risk taking capacity compared to younger ones. In consonance to this, heads of borrower families were found to be younger than non-borrower family heads that may have prompted them to resort to institutions for financial assistance and later invest in productive assets. The average size of family was found to range from 5.5 to 9.4 within borrower families and 5.7 to 6.4 within non-borrower families. With exception of SBTZ, average size of families was higher in borrower categories. It would help us to infer that borrower families might have consolidated land resources compared to non-borrowers. The bigger land holdings with borrowers lend support to this expectation. Large families are more likely to have joint family structure and by and large their land holding remains more consolidated. Another important aspect of farm families is gender; sex ratio was seen to be more favorable among borrowers. Explaining that borrower families have more availability of female labour, which is desired in view of the fact that agricultural activities may be increasingly depend on female labour, owing to scarcity of male labour in few agro-climatic zones in the state (*Baba et al., 2011b*). Dependence on agriculture was found to be higher across different agro-climatic zones compared to other occupations though the proportion of population engaged in this occupation was higher in borrower families except CAZ.

Source-wise institutional credit advanced in different agro-climatic zones : Credit is advanced to agricultural sector either by institutions or by non-institutional agencies. Institutional agencies include cooperatives, public sector banks, private sector bank and rural banks. Different banks have differential role in different agro-climatic zones with respect to advancement of agricultural credit (Table 2). The information of credit advanced to sample farmers in IMZ revealed an important role of cooperatives and public banks. Cooperatives credit in this zone alone constituted area 47 per cent of total credit per farm followed by public banks (41.61%). Private sector banks in this zone were found to have advanced only 11 per cent of total farm credit.

In SBTZ, rural banks were found to have advanced about 76 per cent of total farm credit. Private banks in this zone advanced about 18 per cent of total credit while credit advanced by cooperatives and public banks constituted less than 5 per cent of total farm credit. In

Table 2: Source-wise institutional credit advanced to agriculture in different agro-climatic zones of J&K (‘/farm)

Zone	Cooperatives	Public banks	Private banks	Rural banks	Total credit
IMZ	22888.0(47.27)	20146.0(41.61)	5386.0(11.12)	0.00(0.00)	48419.0(100.00)
SBTZ	4000.0(2.66)	5400.0(3.60)	26960.0(17.95)	113800.0(75.79)	150160.0(100.00)
CAZ	3400.0(7.16)	1700.0(3.58)	42360.0(89.25)	0.00(0.00)	47460.0(100.00)
TMZ	13622.0(6.34)	0.00(0.00)	177407.0(82.59)	23784.0(11.07)	214813.0(100.00)

Figures within parentheses indicate percentage of total,

CAZ, 89 per cent of total credit to farm households was advanced by private banks. In this zone another 7.2 and 3.0 of credit was advanced by cooperatives and public bank, respectively where as the role of rural banks was found absent in this zone. Like in CAZ, private bank credit contributed about 83 per cent while rural banks and cooperative credit respectively constitute 11 to 6 per cent to total farm credit. However in this zone the role of public banks was totally absent, that should be the cause of concern for concerned authorities.

*Capital formation at borrower and non-borrower farm households :*Capital formation means monetary value of all the productive wealth generated at the farm; including implements & machinery, farm buildings (except residential structures), livestock capital, land improvement, orchard plantations, etc. For this paper, per farm total capital formation and livestock capital has been considered and portrayed in Table 3. In consonance with credit advancement across zones, more capital and livestock capital was generated at borrower farms owing to better financial resources compared to non-borrowers. It could be seen from the Table that relatively higher capital stock was generated at borrower farms of SBTZ when compared with other zones. Higher capital formation at these farms was owing to more investment in implements & machineries like tractor, power tillers, and livestock, etc due to plain topography in this zone. As far as livestock wealth is concerned, it was also relatively more in this zone. Across different agro-climatic zones more livestock capital was generated at borrower farms compared to non-borrowers. An interesting phenomenon could be noted in borrower farm household across different zone that more livestock was generated in zone where the disbursement of farm credit was more. The higher total farm and livestock capital accumulation at borrower farms was either because they may have kept more number of animals or they may have purchased improved breeds. To sum up, institutional credit advances help to generate capital stock at their farms that was observed to have significant impact on improvement of gross farm returns in mountain regions (*Baba, 2006*). It is accordingly suggested that institutional credit need to be extended to farmers with a proper policy and supervisory services.

Table 3. Capital formation across agro-climatic zones (000 '/farm)

Particulars	IMZ		SBTZ		CAZ		TMZ	
	B	NB	B	NB	B	NB	B	NB
Livestock capital	49.9	19.4	89.8	33.4	35.2	21.1	30.7	16.2
Total farm capital	91.2	42.5	543.1	95.8	110.5	42.2	196.5	75.5

Table 4. ACUs and adoption of cross bred animals (CBA) in different agro-climatic zones in J&K

Particulars	IMZ		SBTZ		CAZ		TMZ	
	B	NB	B	NB	B	NB	B	NB
ACU (No.)	3.5	2.3	5.7	2.4	2.8	2.6	2.2	1.5
CBA (%ACU)	85.6	60.7	93.8	70.5	72.9	59.3	83.2	57.2

Table 5. Regression estimates of livestock ownership

Variable	Regression coefficients			
	TMZ	CAZ	SBTZ	IMZ
Constant	-1.005	-3.957	0.999	1.344
AGE	0.008 (0.010)	0.023 (0.025)	0.008 (0.009)	-0.023*(0.013)
LIT	0.241*(0.102)	0.463*(0.194)	0.128*(0.083)	0.134*(0.04)
FMS	0.082*(0.047)	0.111(0.132)	0.128*(0.034)	0.149*(0.052)
IRA	0.012*(0.005)	0.026*(0.012)	0.012*(0.008)	-0.001(0.004)
AHS	0.020*(0.009)	0.034*(0.013)	0.001 (0.001)	0.015(0.035)
CRD	0.045*(0.020)	0.254*(0.076)	0.095*(0.008)	0.103*(0.016)
Adjusted R^2	0.544	0.518	0.634	0.553
f-statistics	10.275*	7.213*	26.297*	12.790*

*Denotes significance at 0.05 or better probability levels; Figures within parentheses indicate SE of regression coefficients

Adult cattle units and differential adoption of cross/ improved bred animal : Farmers in different agro-climatic zones domesticated different kind of animals depending upon production environment in each zone. In this section all kind of animals were converted in adult cattle units (ACU) for comparison between borrowers and non-borrowers of institutional credit. More livestock capital generation at borrower farms corroborated into more number of ACU on their farms compared to non-borrower farm families in all agro-climatic locations (Table 4). There appears a gap in possessions of ACU between borrower and non-borrower farm families in all the zones and this gap was wider in SBTZ followed by CAZ. More unproductive utilization of credit amount in this zone could have resulted in lower gap between borrowers and non-borrowers in visibility of livestock at farms in IMZ. Credit advancement appears to be an important determinant of ACU per farms and amount of credit determinants width of gap between borrower and non-borrower farms.

Crossbreeding of indigenous stock with exotic animals is a well known strategy for improving the productivity of indigenous stock mainly of cattle, sheep and pigs (*Kumar, Anjani, 2006*). With an intention to find out the extent of adoption of crossbred animals at borrower farms in comparison to non-borrowers, percentages were estimated and presented in Table 4. Generally the adoption of cross bred animals were found higher at borrower farms that could be owing to better capital availability for purchase and management of cross animals with them. In CAZ, crossbreds comprised 85 per cent at borrower farm household, as against only 60.7 per cent at non-borrower farms. In similar fashion, farmers having availed loan facility for farm activities have higher proportion of cross animals at their farm compared to non-borrowers. The lower adoption level of cross bred animals especially at non-borrower farms indicated untapped potential of improving animal productivity through advancement of institutional credit for replacement of indigenous breed with improved animals.

*Model estimates :*Separate regression function was formulated for each agro-climatic zone to quantify the determinants of livestock ownership in the state and their estimates presented in the Table 5. The *f* –statistics for each zonal function is statistically significant at 0.05 level of probability, indicating variables specified in the function were best fit. As expected, regression coefficient of institutional credit turned positive and significant determinant of livestock ownership in all the agro0climatic zones of the state. These finding coupled with evidence of higher adoption of cross bred technology by borrowers' farm family unveiled a crucial role of institutional credit in livestock development of the state. Literacy was another factor which has been instrumental in increasing livestock holding as evident from its estimated coefficient in all the zonal functions. An educated entrepreneur has a broader vision and could understand the economic viability of livestock enterprise and in turn their ownership. The coefficient of average holding size indicated that more the size of land holding more will be the number of livestock at the farm. The large size land holding provide enough space for their shelter and could help in developing linkages between cultivated area and livestock. As indicated by regression coefficient, the relationship between average holding size and livestock holding appears to be stronger in CAZ. Another significant determinant was irrigated area, although its estimate was not statistically significant in IMZ. Since livestock is a labour intensive venture, therefore, family with more members would be able to manage more animals at their farm. These expectations were supported by the regression coefficients of average family size in zonal functions (Table 5). To sum up in all the agro-climatic zones, institutional credit came out to be a significant determinant contributing to the improvement of livestock ownership, thereby emphasized upon enhancement of direct institutional credit per hectare of cropped land.

CONCLUSION

This study was undertaken to find out the pattern of ownership of livestock in relation with institutional credit at farms of different agro-climatic zones of J&K. Micro level analysis clearly indicated that borrowers of institutional credit were well endowed to invest more on farm capital and livestock capital in particular and in turn improve their livestock possession. Borrowers of institutional credit not only have higher livestock holding but also were more innovative towards adoption of cross bred technology, implying a crucial role of institutional credit in the development of livestock sector in the state. The regression estimates also indicated that institutional credit along with literacy level of head of farm family, average holding size, proportion of irrigated area and average family size has been a significant determinant of livestock ownership across different agro-climatic zones of J&K.

On the basis of the findings, it could be inferred

that the institutional credit has been instrumental in improving livestock ownership and government should enhance direct credit to farmers firstly to protect them from informal agencies and to encourage them to invest in livestock capital. This would be a better preposition to tap unexploited potential that could accrue by increasing adoption of cross bred animals. Location specific loan schemes need to be launched where in due care needs to be taken on specific production environments that favour performance of different livestock species. Credit advancement should be accompanied with supervisory services to ensure its productive utilization and timely repayments. Resource poor farmers in hills may not have collateral against loan; in that case group lending needs to be encouraged and they should be brought under safety nets.

Acknowledgement : This study is based upon work done under UGC sponsored major research project, "Study of rural credit and its impact on agricultural growth and sustainable livelihood in J&K". We duely acknowledge the financial assistance provided by the Commission for conduct of this study.

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