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Risk analysis in cattle fattening in North West Ethiopia: Empirical evidence form two limit Tobit model

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Abstract

Resource allocation is a point of concern in small to large farms and is generally argued that small farmers in developing countries are "poor but efficient", trying to allocate the limited resources to unlimited desires efficiently in the given production system in the light of their life-long experiences. The issue of market orientation in cattle fattening is basically challenged with the risks and uncertainties in the production and the market. Data were collected from 112 purposively selected fattening operator farmers from 3 districts and 6 peasant associations to see the risks. The data were analyzed through both descriptive and econometric statistical tools using STATA. Only about 13% of the respondents have participated in the farm business with own capital and the vast majority borrowed from Amhara Credit and Saving Association (ACSI) through their cooperatives. It is found that production risks are limited while economic and market related risks play vital role in the farm operation. Duration of stay of the cattle, land holding of the household, distance to the development agent's office and age of the household head increase the risk averse nature of the household and limit their participation in export market. In the other hand, frequency of fattening enhances the risk taking character of the households and their participation in the export of cattle. It is vital to enhance the institutional support from the public to enhance the gain from the fattening activity and market orientation of farming.

Keywords: Fattening, Marketing, Market orientation, Risk, Tobit

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1. Introduction

Resource allocation is a point of concern in small to large farms and is generally argued that small farmers in developing countries are "poor but efficient" (Shahid, 1997). The argument is that farmers allocate their limited resources efficiently in the given production system in the light of their life-long experiences. However, with the improved availability of technologies, sharp decline in the available farm land, enhanced competition for resources, fluctuating market conditions, climate change and ever changing public policies, the issue of "efficiency" seems no more valid.

Livestock production in the developing world is under pressure from two sides: a decrease farmers' income through a decrease in product prices and increased costs with small-scale production system; this encourages farmers to switch to more intensive production systems. However in the other direction, the sharp increase in the price of food products in the world and enhanced demand for meat and milk in the world markets is expected to encourage either small or large scale producers operating in cattle enterprise (Schwabenbauer, 2004). The production sector in Ethiopia is weakly linked with the input and output market which suppresses the income fetched from the sector.

Most policy dialogues and research discussions in the area of livestock production circle on the importance of market orientation in livestock sub-sector, and agriculture in general. Even though it is argued that transformation in the sector is quite unquestionable, market imperfections and limited access in market information while the rise in production cost takeout the issue from an easy decision making activity (Habtamu and Moti, 2011).

Sometimes in agricultural operation, farm operators may not use their production factors efficiently either couldn't produce in appropriate scale or couldn't use their inputs properly in an optimal way. It is well stated in many research works related to farm operation and maximization programs, farmers make their decisions to optimize their outcome with multiples of goals they had and sets of constraints that the farm operation is going to challenge (Wondimagegn, 2010)

Production loses certainly occur in agricultural business due to technical, socio-economic and policy related circumstances on the one hand and natural disaster and related risks on the other (Hazel, 1971; Wondimagegn, 2010). When the decision of the farm operator is getting out from considering these components and circumstances, it affects the farming income in negative or positive side.

The performance of livestock has been poor compared even with other African countries due to inadequate feed and nutrition, widespread disease and poor health, and inappropriate livestock polices with respect to credit, extension, marketing and infrastructure (Degefe and Nega, 2000).

Despite the fact that fattening is usually considered very important, the issue of market orientation in cattle fattening is basically challenged with the risks and uncertainties in the market.

There was no study done in the area of fattening of cattle as a business in general and risks and uncertainties related with the farm business in particular. The sources of risk are not well assessed, the copying mechanisms that farmers in a small or large scale implement to reduce risk were not explored and

the success of the farm operation was not well studied in the area. This paper was initiated to address the knowledge gap which circles the issue of market orientation in cattle fattening and risks related with it.

The specific objectives are:

- To study the cattle fattening and marketing system in the area
- To assess the sources and effects of risk in cattle fattening
- To explore the copying mechanisms that farmers had for reducing risk in the farm

2. Methodological framework

2.1. Conceptualization of the study

This study primarily initiated to answer the questions which are frequently raised related with the fattening enterprise. Fattening is promoted by the public and different organizations in the sector as a means to link farmers to the growing demand in meat in the domestic and export market. Fattening as an enterprise is a function of different factors and variability in those factors which play the rule of the game. Risk is conceptualized as perception on the state of nature which affects the production decision of the household. The links between the perception of risk, uncertainty and state of the market nature in the production decisions of the households and the influence of the demographic, socio-economic, institutional and other factors on the decision of the households are the focuses of the study. Farmers adopt different risk copying mechanisms and strategies as a response to different risks prevailing in the production system which extends from the production to marketing of products.

Even though risks are pervasive in the farm operation all over the world (Wondimagegn, 2010), the types, intensity and effects of the risk and the copying mechanisms of the farmers and farm operators are different with different farming systems, climatic condition, policy, institutional settings and household characteristics. In this study, different sources of risk in fattening activity were analyzed and prioritized based on their experience. The effect of the institutional and socio-economic variables and characteristics of farmers on the decision making process was then analyzed.

2.2. Methodology of the study

Both formal and informal survey procedures were implemented for the collection of primary data. The main material of the study was obtained from the formal survey done in three districts of North Gondar, Ethiopia using multistage sampling techniques. The three districts and two peasant associations were selected purposively to get reasonable sample size of fattener households and probability proportionate to size technique was used for the selection of the sample households.

Descriptive statistical techniques were employed for the analysis. In addition, it was proposed and used to rank farmers responses regarding risk related questions. The dependent variable is limited (censored on both sides to the left and right since there are observations with zero and one and the rest is proportion). It is

not recommended to use the Ordinary Lease Square (OLS) for the case in consideration due to this nature of the data and censored regression models are employed. Tobit model is preferred to the Ordinary Least Square (OLS) for the purpose for censored dependent variable (Gujarati, 2004) .

The tobit model here was employed to see the influence of variables theoretically expected to influence the profitability of the business. Different demographic, institutional, socio-economic and risk perception of the household were included in the model.

For the case, risk parameter of the household is defined as:

$$\sigma = \frac{Number\ \ of\ \ cattle\ \ trucked\ \ to\ the\ export\ \ market}{total\ \ number\ \ of\ \ cattle\ \ fattened}$$

The two-limit Tobit model can be specified as:

$$Y_i^* = \beta' X_i + \varepsilon_i \text{ with specification of } \left\{ Y_i = \begin{cases} 0 & if\ Y_i^* = 0 \\ Y^* & if\ Y_i^* > 0 \\ 1 & if\ Y_i^* = 1 \end{cases} \right\}$$

Where, Y_i^* is latent variable (unobserved for values smaller than 0) representing σ (the share of cattle trucked to the export market) from fattening enterprise, X_i is a vector of independent variables, which includes factors affecting the risk perception of households which is defined before, β is a vector of unknown parameters, and ε_i is the error (disturbance term) assumed to be normally distributed with zero mean and constant variance σ^2 and i=1,2,3…..n (n is number of observations). Marginality analysis is quite pertinent here to see the contribution of marginal change in the risk perception to the change in the independent variable. The marginal analysis was implemented for all of the variables and the interpretation is based on this marginality test.

In regression analysis, multicollinarity and hetroscedasticity are the issues which should be considered before making any inference based on the estimation results. The explanatory variables used in the logit model should be checked for the absence of strong multicollinarity. Variance Inflation Factor (VIF) and Contingency Coefficient techniques were employed for checking the occurrence of multicolliarity in the model for continuous and discrete variables (Gujarati, 2004). A large VIF (VIF approaching 10) could dictate for a strong linear relationship between the explanatory variables while smaller value (VIF approaches to 1) indicate the model is free of multicollinarity. A correlation coefficient approaching to one dictates the presence of strong multicollinarity in contingency coefficients.

3. Result and discussons

3.1. Descriptive statistics

3.1.1. Socio-economic characteristics of sample households

Of the group of households involved in cattle fattening in the study area, male headed households are dominant. Only two households from the random sample are female headed households. The descriptive statistics of the study reveal that about 46% of the total sampled households are illiterate. About 48% of the sample households have been attending/have attended primary education and it is only about 7% for secondary level education. Despite the fact that the number of literate household heads is significant, the scenario is changing to their children.

All the sampled households reported that they used agriculture as the dominant livelihood option. About 64% of the total households take agriculture as the only means of livelihood in the study area. To supplement the income from agriculture, 30.4% of them involved in petty cash trading in the farm gate, primary and secondary markets around the village. Finger count of the households (only four of the sample households) has been involved in handicraft and supply jewelries, clothing and home furniture to the village people and nearby markets. One of the households reported that casual labor is used as an income generation source to supplement agricultural production.

The house condition of the household was considered in many literatures as the expression of the wealth of the household in Ethiopia (Yibeltal, 2008). However in these days, most of the households have constructed houses from corrugated iron. As to our discussion, fear of fire obliges them to construct such types of houses. Only two of the sample households have had grass roofed houses.

The age structure of the sampled household heads reveals that the study covers representative age groups ranging from 24 to 73 years of age. Farm households spent from 2 to 55 years in agriculture (mean of about 26 years) which tell us that they on average have had adequate farming experience. Labor availability in the household in terms of man equivalent ranges from 0.5 to 6.25 (with mean of 2.72). Households in the study area have an average of 2.69 oxen and oxen are mainly kept for source of draft power for farming activities. About 12% of the total households have had no oxen for farming activities and the other 15% have only one oxen. This might tell us a significant percent of the total population is facing problems of lack of draft animals in times of plowing.

3.1.2. Production system and cattle fattening

In the informal survey, farmers have agreed that lack of capital to pay for the production cost in fattening is they factor to limit their participation in the enterprise. In line with the informal survey, of the total interviewed households, only 12.5% have used their own capital for the investment in cattle fattening. The rest 87.5% of the sampled households have used borrowed money from the cooperative union for the purchase of cattle and feed.

Feed shortage is becoming the issue in the mid and high altitude areas in which crop-livestock mixed production system is predominant with the population rise. In addition, in our group discussions, they also claim that the quality of the feed resources available is deteriorating through time with the expansion of farmland. Only 8% of the total sampled fattener households sent animals kept for fattening, for grazing. Crop residue and industrial bi-products are the dominant sources of feed in fattening enterprise. About 96% all of the households use crop residue and industrial bi-products for fattening. 66% of them have collected hay in

the harvest season for fattening and only about 14% of the sampled households grow improved fodder and/or shrub/ grass types. The wide diversity in types and varieties of feed sources can tell us that the need for feed formulation from locally available feed resources and it needs critical assessment for the quality of this variety of feed resources.

Table 1. Definition of Variables and Hypothesis

Variable	***Type***	***Measurement***	***Hypothesis of relation with the dependent variable***
Age of the household head	Continuous	Years completed	-ve
Sex of the household head	Dummy	1 for male, 0 for female	+ve or –ve
Number of literate family members	Continuous		+ve
Labor available in the HH	Continuous	Labor availability in adult equivalent	+ve
ASSETHH	Continuous	Total asset	+ve
LIVESTLU	Continuous	Livestock in Tropical Livestock Unit (TLU)	+ve
TIMEINPT	Continuous	Time to reach to the input suppliers in hours	-ve
TIMEDEVT	Continuous	Time to the development center in hours	-ve
TIMEPURC	Continuous	Time to reach to purchasers in hours	-ve
EXPRFATT	Continuous	Experience of the HH in fattening in years	+ve
FREQFATT	Continuous	Frequency of fattening in the production year	+ve
LANDHOLD	Continuous	Landholding of the HH	+ve
AVFDCOST	Continuous	Average feed cost per animal	+ve or -ve
AVTIMEST	Continuous	Average time of stay in months for fattening	+ve or -ve
AVOXCOST	Continuous	Average oxen cost purchased for fattening	+ve or -ve

Table 2. Summary of the socio-economic characteristics of households

Variable	*Number*	*Frequency*
Sex of the household head		
Male	110	98.2
Female	2	1.8
Educational level of the Household head		
Illiterate	51	45.5
Primary education	53	47.3
Secondary School	8	7.2
Education at the household level		
One and more than one child above secondary school	68	60.7
One and more than one child in college level	14	12.5
Means of livelihood of the sample households		
Agriculture only	72	64.3
Agriculture and petty cash trading	34	30.4
Agriculture and handicraft	4	3.6
Agriculture, petty cash trading and handicraft	1	0.9
House condition of the sample households		
Grass roofed	2	1.8
Corrugated iron roof	110	98.2

Source: Author's survey, 2010

Table 3. Summary of the characteristics of households

Variables	*Minimum*	*Maximum*	*Mean*	*Std. deviation*
Age of the HH head	24	73	43.99	9.72
Years in agriculture of HH head	2	55	25.56	11.72
Family size	1	13	7.25	2.18
Labor contribution (in man days)	0.5	6.25	2.72	1.15
Number of oxen	0	12	2.69	2.17
Total Livestock in TLU	0	25.82	7.08	5.67

Source: Author's survey, 2010

Table 4. Fattening production system

Variable	*Number*	*Frequency*
Source of capital for fattening		
Owned	14	12.5
Borrowed	98	87.5
Feed source		
Crop Residue	108	96.4
Hay	74	66.1
Improved fodder shrub/tree/grass	16	14.3
Industrial bi-products	112	100

3.2. Risk and uncertainty in fattening enterprise

Fattening is considered profitable as a business in general terms especially for countries with large cattle population like Ethiopia. The cost benefit analysis result showed that a household can fetch about 18000 birr per year of gross margin in average terms. The analysis done per household base per animal terms showed that a household can fetch about 540 birr of gross margin for one oxen kept for fattening.

3.2.1. Sources of risk in fattening enterprise

Some producers (27.7% of the sample) nevertheless, experienced a negative margin between buying and selling prices, due to uncertainty in the input and output market and technical, socio-economic and institutional factors playing the rule of the game. As to our informants, price seasonality related risk is considered to be the important source of risk for the farmers in the fattening business.

Unless farmers have had (are given) an opportunity to borrow from cooperatives established, it seems impractical to invest from own sources. About 12% of the total sampled households invest from their own sources for fattening whilst the larger majority is watching for micro-financial institutions and cooperatives for loan.

In our discussions farmers raised that livestock producers are supplying their livestock to the market (directly by fattening them or to fatteners) and the number of cattle population per household base is decreasing. This might be related with the rise in the price of live animal and their products .The price of oxen in the country is increasing for the last five and ten years as a response to the domestic (with the rise of the population of the country) and the export market demand. The rise of price of crops and fuel in addition to the growing demand for feed ignite the rise of price of industrial bi-products in Ethiopia. These all raise the cost of investment in fattening and made it unaffordable for farmers.

Table 5. Sources of risk in cattle fattening

Variable	*Number*	*Frequency*	*Rank*
Price seasonality related risk	109	97.3	1
Lack of capital to purchase oxen, feed,…	103	92	2
Input cost (oxen, feed…)	91	81.2	3
Lack of finance for market related costs	76	67.9	4
Disease	73	65.2	5
Shortage of land	72	64.3	6
Shortage of water (drinking, irrigation of fodder)	68	60.7	7
Personal risk (health, experience, labor…)	37	33	8

Source: Author's survey, 2010

Even though farmers have raised disease of livestock is important sources of risk in the fattening enterprise, only three oxen have died with disease problem. Some of the farmers have also faced personal risks associated with their and their family members' health condition and labor availability. Even though fattening can be considered as limited labor demanding enterprise, some farmers argued that they have options of working in the lowland areas of *North Gondar* which can pay better for them.

The business needs experience of the value chain which the majority farmers lack. Different markets like farm gate, primary, secondary and the terminal market (in this case the export market) pay different prices for their product and the availability of reliable market information is the issue of concern here. In general terms, the social interaction and network of the household can be considered as a risk or opportunity in the success of the operation depending on the activity of the household.

In addition to the above mentioned sources of risks, they have raised that producers have fetched different returns from the enterprise. The market for fattened cattle and return from the activity is affected with different factors along the value chain. Only about 7% of the interviewed households reported that all famers gain equal return with the same quality of products supplied in the market.

Market information gap is considered important in affecting the gain from selling fattened cattle. Those who have timely, reliable and valid market information fetch better price with the same quality of fattened animals. The source of market information for the households participate in cattle fattening comes from different sources (relatives, neighbors, traders, brokers, cooperatives and rural development offices) while all question the validity of the information.

The market for fattened cattle in the export market is seasonal, has fluctuating demand and price and exporters lack confidence in the market. With this phenomenon, farmers usually face problems of sharp falls in the price of fattened animals. Despite the fact that no one gets reliable information in the market, experience of the producer in the market is considered important in deciding the gain from the enterprise.

Relationship of producers with traders (collectors or exporters) and brokers has affected the gain. They have reported that brokers help and facilitate to sell in the export market for those with good relation while hinder others from selling. The credit selling system is also considered important here and helps to get good price from selling. It is said that Importers give good premium from those selling for them in credit.

Table 6. Source of variation in price of fattened animals

Source of variation in price	***Number of households***	***Percent***
Market information gap	63	56.2
Experience and skill of producer	60	53.6
Relationship with traders	51	45.5
Relationship with brokers	50	44.6
Credit selling system	36	32.1

Source: Author's survey, 2010

3.2.2. Market and marketing in fattening

Markets and marketing system of fattened cattle are the dominant sources of risk in the production units of farmers. Agricultural enterprise is inelastic by nature in general terms and is not responding fast to the signals in the market. As to the discussion with producers in the area, fattening enterprise is found elastic to the change in the price of the commodity. It arises from the duration requirement (two months is the average in this case[1]) for fattening in the one hand, and greater risk related to the business on the other hand.

Most farmers prefer to sell fattened animals at the export market (at *Metema Yohannis*). Even though no farmer had a license to export cattle, 550 cattle (31.52% of the total observed) were exported directly by farmers themselves. They usually rent in export license in a cost of 100 birr per animal from export traders in addition to the cost of transportation. They also have to feed their animals in the route to the export market and in the final market till they sell them. Marketing of cattle in the terminal market (the so called the export market) has been taken after cattle have reached to the place with "eye-ball" negotiation (Habtamu and Akalu, 2011). These all increases the cost associated and enhances the risk related to the business. In addition, the variation in types of markets and customers also influence the gain from fattening due to the difference in risks even though all the markets have no market facilities at all.

3.2.3. Risk copying mechanisms and strategies

Economic risks are considered important sources of risk for fattening in the study area. Almost all farmers are concerned with difficulties related to the ups and downs in the price of fattened animals and increased cost of risk are very crucial in the decision making process. Price and cost related risks were reported by 97 and 81% of the sample households as important sources of risk in fattening.

[1] average of two months is short as compared to the seasonality and rainfall demand of agricultural activities

All farmers responded that different markets give different return for producers. Most farmers prefer to supply their animals to the export market considering better price from the market and since the amount of purchase of cattle is large. Almost all farmers fatten cattle through borrowed money while most importers prefer to pay late a month or more after they took cattle. Some of the farmers also complained that they didn't get the money back which requires for institutional support services in the export market. These all increased the risk associated with the enterprise and they are frustrated to supply to the export market.

Table 7. Market outlets for fattened cattle

Cattle sold	***Number***	***Percent***
At the farm gate	535	30.66
In primary markets	285	16.33
In secondary markets	212	12.15
At the export market	713	40.86
For another farmer	85	4.87
For consumers	33	1.89
For collectors	81	4.64
For exporters	996	57.08
Cattle directly exported	550	31.52

Source: Author's survey, 2010

Table 8. Factors associated with market preference

Market preference	**Price**		**Amount of purchase**		**Immediate payment**	
	N of HH	*Percent*	*N of HH*	*Percent*	*N of HH*	*Percent*
Other farmers	0	0	0	0	1	0.9
Consumers	4	3.6	0	0	7	6.2
Collectors	6	5.4	19	17	16	14.3
Exporters	67	59.8	88	78.6	89	79.4
Importers	80	71.4	96	85.7	51	45.5

Source: Author's survey, 2010

To reduce the outcome of risk in fattening, farmers reported that they have difference risk copying mechanisms and strategies. Reasonable percent of households (52.7%) replied that they are obliged to reduce the price of cattle by losing the premium and even below the cost of production if they face a decline in the cattle market price. This might be explained by the fact that since market places in the country have had no feeding or watering lots in which cattle will lose weight which affects the price, or otherwise, if they have to feed them, it is an additional cost which reduces the premium. It is again very difficult for produces to

go back home and wait for another market day and only about 18% of them use this strategy. With all the constraints discussed above, about 38% of farmers have searched for other markets with good price premium as a copying mechanism for market related risks.

Table 9. Copying mechanisms for market risks

Copying mechanism	***Number of households***	***Percent***
Reduce price	59	52.7
Alternate markets	53	38.4
Back home	20	17.8
Use for food	1	0.9

Source: Author's survey, 2010

3.3. Econometric analysis

As to the discussion with farmers involved in fattening, the fattened animal market is explained with high risk and risk averse farmers prefer to sell in the farm gate. About 40% of fattened animals were sold directly by their producers in the export market. Hence, the premise in the risk preference parameter in this case will be as the proportion of cattle trucked to the export market increases, the risk preference of households increases.

As to the informal discussion with the key informants, most farmers fear economical and related risks in the terminal market and sell in less risky markets (in this case, the farm gate primary and secondary markets). The perception of households to these sources of risk is different which influences their reaction. In the same way, the information they had regarding the market is also limited and different. Six of the fifteen independent variables in the model have had significant effect on the decision of households to truck their cattle to the export market, which is considered risky.

As the age of the household head increases, the risk averse nature will increase and older household heads usually prefer to sell at the farm-gate to selling in the export market (Table 10). The result is in line with the work of Wondimagegn, (2010) in the factors affecting farm diversification for risk aversion. In his study, farmers decision for crop diversification in East Harerghe is positively influenced by land holding.

As the distance of the household to the development agents office increase, the participation to the export market is limited (Table 10). Farmers reveled in the informal discussion that development agents are used as a source of technical, technological and market information for households and risk is a function of reliable market information. This finding is similar with the work of Berhanu et al. (2006).

Table 10. Tobit model result

Variables	*Coefficient*	*Std err*	*Z*	*P*	*ME[2](Probability)*	*ME[3](Intensity)*
Constant	0.04	1.06	0.45	0.66		
AGEHHH	-0.03	0.15	-2.03	0.04	-0.014	-0.076
SEXHHH	-0.19	0.77	-0.24	0.81	-0.095	-0.051
FAMLITRT	0.02	0.05	0.36	0.72	0.009	0.004
LLAGRICT	0.11	0.09	1.15	0.25	0.052	0.028
ASSETHH	-2.53e-08	4.76e-07	-0.05	0.96	-1.19e-08	-6.33e-09
LIVESTLU	0.15	0.02	0.69	0.49	0.007	0.004
TIMEINPT	0.03	0.13	-0.25	0.80	0.015	0.008
TIMEDEVT	-1.52	0.62	-2.43	0.02	-0.715	-0.381
TIMEPURC	-0.12	0.11	-1.10	0.27	-0.059	0.031
EXPRFATT	0.03	0.02	1.32	0.19	0.016	0.008
FREQFATT	0.37	0.13	2.77	0.00	0.176	0.093
LANDHOLD	-0.29	0.14	-2.07	0.04	-0.138	-0.074
AVFDCOST	0.019	0.044	0.45	0.66	0.000	0.000
AVTIMEST	-0.146	0.072	-2.02	0.05	-0.069	-0.036
AVOXCOST	0.028	0.016	1.23	0.24	0.000	0.000
N	112					
Prob > chi2	0.0000					
LR chi2(15)	49.27					
Log likelihood	-67.31					
Pseudo R2	0.2679					

Source: Author's estimated results, 2010

Experience of the farm operator is found vital for risk taking character to participate in the export market. One year additional experience let the household to know better regarding the market. This is due to the fact that the experience in fattening will enhance the knowledge of the production, market and marketing system which in turn, enhance risk taking characteristics of the household.

The landholding of the HH has negative relationship with the risk taking character in livestock fattening enterprise. This might be because land holding is highly related with crop production and had no positive effect on the risk taking character in fattening. This is in line with works of Berhanu et al. (2010) with crop marketing participation. The result, however, contradicts with Wondimagegn (2010) and that is due to the fact that his work is related with crop production risk where land holding positively related with risk taking character.

As the duration of stay in the farm of animals increase, the cost of production increase which in turn limits the profitability and risk taking character of the household to truck to the export market. In this case, as the stay (duration of fattening) increases, the frustration to commit loss and to the market increases. The participation of farmers by supplying their cattle directly to the export market will fall in question.

[2] The partial marginal effect shows the effect of a change in explanatory variables on the probability of participation to the export market

[3] The partial marginal effect shows the effect of a change in explanatory variables on the intensity (level) of participation to the export market

4. Conclusions and recommendation

The wide diversity in types and varieties of feed sources, where no specific amounts of feeding is practiced in the area. It calls for the need for feed formulation from locally available feed resources and industrial bi-products. It also needs critical assessment for the quality of this variety of feed resources.

The markets for live animals along the chain lack essential facilities of live animal markets. Well developed and specialized live animal markets with feed lots, water supply, shelter e.t.c are essential components of infrastructure development to enhance the efficiency of live animal markets and to improve the bargaining power of producers.

Reliable and timely input and output market information is quite pertinent component to enhance the market participation of producers. It is recommended that the public should upgrade the efficiency of organizations and institutions to play their role in delivering reliable and timely market information. Cooperatives have contributed to enhance the market oriented production and participation of rural households. Commodity specific cooperatives could play an important role to the farmers participating in the area. With this regard, support is quite important from the public to engage them in the export market.

Experience in the business is found important variable to affect risk taking character of farm households. Knowledge of the market can come either through experience or agricultural marketing trainings. Training regarding the value chain the area is relevant for the participants from the public and is suggested to enhance their participation.

The duration of stay in the barn for fattening has multitude of problems in the business by increasing the cost of production from the optimal level and compromises the risk taking character of the households. The business will be profitable in some fixed time horizon and the participation in the export market by taking risks associated declines with the increase in the duration of fattening. It is suggested to sell fattened cattle in the recommended time.

Landholding of the household is found to have negative relation with the risk taking of the household to participate in the export market. This otherwise means, farmers with less land have a courage and take risks to participate in the export market. It is suggested that farmers with minimum land holding (and even land less for crop cultivation) might engage in the business.

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