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**ADOPTION OF SMALL RUMINANTS' FATTENING PACKAGE IN
AGRO-PASTORAL AREAS, DUGDA DAWA DISTRICT, SOUTHERN
OROMIA, ETHIOPIA**

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ABSTRACT

Many studies were conducted to identify determinants of adoption of crop base technologies and practices and improved seeds, and while few studies concerned on evaluation of extension services in terms of the clients' need and interest or adoption of livestock technologies in agro-pastoral and pastoral context. In fact, livestock extension services in general in developing countries are less prioritized and thus livestock based technology services are rarely extended. Common livestock technologies which are promoted to livestock raisers are focused on feed, veterinary services, and improved management practices through the extension services of agricultural/pastoral offices and livestock development units. The case hereunder, is about agro-pastoralists extension services evaluative perception and small ruminant fattening package adoption. Hence, this study investigates agro-pastoralists' perception on the extension services, small ruminant fattening package and intensity of adoption of small ruminants' fattening package. The study is undertaken in Dugda Dawa Woreda, Oromia Region, Ethiopia. The Woreda has agro-pastoral and pastoral production system. The data were collected from 151 randomly selected pastoralists and agro-pastoralists using structured interview schedule. Secondary data were collected from different sources to supplement the data obtained from the survey. In addition to quantitative data qualitative data also gathered. Prior to formal survey an informal survey was also undertaken by using group discussion and interview with key informants. Descriptive statistics such as frequency, percentage mean, standard deviation, Chi-square tests and t-test were employed. The Tobit model was also employed to determine factors influencing intensity of small ruminant fattening package adoption. This study identifies agro-pastoralists and pastoralists are poorly addressed and their need and interests are not considered in any extension programmes. The Tobit model output showed that, agro-pastoralists intensity of adoption of small ruminant fattening package is influenced by: perception on the availability of improved breed, perception on resources based conflicts, current management practices, total livestock holding of HHs and credit use and availability for veterinary purposes. Future extension activities and agencies, promoting fattening package in agro-pastoral and pastoral areas, should focus on targeting agro-pastoralists with low perception on the availability of better breed, information and demonstration on the improved management practices, revision of credit supply criteria, making awareness and demonstration of the significant importance of small ruminants in the agro-pastoral and pastoral income and livelihoods contribution is important.

Keywords:*Adoption, Fattening Package, Tobit model.*

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1. INTRODUCTION

Ethiopia has the largest livestock inventories in Africa, including more than 38 million cattle, 30 million small ruminants, approximately 1 million camels and 4.5 million equines and 40 million chickens (CSA, 2004), with livestock ownership currently contributing to the livelihoods of an estimated 80 percent of the rural population. The contributions of livestock include food production, input for crop production and soil fertility management, raw material for industry, power source, cash income, saving, fuel, social functions and employment. The contribution of livestock to total GDP and agricultural GDP of Ethiopia ranges from 12-16 % and from 30-35 %, respectively (MEDaC, 1998). The livestock sector contributes about 8 % of the total export earnings, and is the fourth major source of foreign currency through export of live animals, hides and skins. Livestock is an important sector in both highland mixed smallholder farming and low land agro-pastoral systems in Ethiopia. The development of both highland smallholder mixed farming and the lowland agro-pastoral/pastoral systems is paramount to the development of the economy of the country, contributing to food and livelihood security of the majority of the population of the country.

According to CSA survey, almost 99 percent of the cattle, sheep and goat population in the country are indigenous. Of the total livestock, 75 % are in the highland and the rest are in the lowlands. In the arid and semi-arid extensive grazing areas in the eastern, western and southern lowlands cattle, sheep, goats, and camels are managed in migratory pastoral production systems. Ethiopian goats fall into many breeds and types. There are 15 distinct indigenous goat types in the country. The trend in livestock production at national level, and the factors associated with or influencing productivity level has proven very difficult to obtain. Besides, the corresponding national level aggregate data on livestock number and production (collected from the FAO Year Books and from the Central Statistical Office Ethiopia) that were to be correlated with factors believed to have influence on livestock productivity were found to be problematic. Small ruminant production and management in the agro-pastoral and pastoral farming system is characterized by a low-output system based on open grazing and the use of crop residues. Goats graze and browse a large area of land that are usually of marginal and unsuitable for other agricultural use. They roam freely either mixed with sheep or alone. The main feeds of goats include tree leaves, shrubs, grasses and related plant species. This system is marked by low productivity compared to many other countries in the world, due to recurrent drought, lack of feed and fodder and poor management practices.

Institutional support to promote and expand the production and productivity of this sub sector of agriculture had been and still is not comparable with cereal production extension in Ethiopia. Livestock development had been one of the major components of agricultural extension package since 1950s. First Five Year Plan (CADU, WADU etc.), EPID, CPP, MPP I, MPP II, PADETES

all had livestock extension programs but the efforts made to improve livestock sector are not satisfactory. In fact, a clearly stated national livestock development strategy has not yet been formulated. Livestock development has generally been considered under agricultural development plans, and accordingly concerned institutions for agriculture (be it education, research and extension) are mandated to address livestock development within the agricultural context. Livestock education, research and extension institutions follow the traditional top down approach, and the technology transfer model prevails largely unchanged. The efforts have been towards promoting specialized livestock production systems such as beef, dairy, poultry, etc. through the introduction of exotic breeds of cattle and forage species, and to come up with cheaper animal feed combinations (Habtemariam, 2000).

Livestock extension in Ethiopia mainly focused on few aspects like AI (artificial inseminations for cattle), dairy cows and goats' distribution, forage and feed species seed distribution and, trainings and demonstrations in animal health management, feeding, herding, and general appropriate rearing practices. These are the common livestock extension services given to farmers all over the country through woreda experts. The recommended package components in Dugda Dawa woreda are improved feed, veterinary and health practices and services, and improved management practices of small ruminant rearing (feeding management, health caring, watering, market information and trainings related with these management practices).

2. IMPORTANCE AND ROLE OF GOAT AND SHEEP IN PASTORAL AND AGRO-PASTORAL LIVELIHOODS

Goats are kept in a wide range of agro-ecological zones and management systems in Africa (Peacock, 1996). Livestock production in Sub-Saharan Africa is dominated by pastoralism and agro-pastoralism. Pastoralism is practiced in areas not suitable for cultivation and agro-pastoralism in areas where the agro-climatic conditions favor crop production. Livestock are vital to the subsistence and economic development in Africa. They provide year-round flow of essential products, sustain the employment and income of millions of people and contribute draught power and manure for crop production. Pastoralists are increasingly realizing that they need to rely on goats more and more. The increasing frequency of droughts, together with long-term environmental degradation, is causing many pastoralists to shift from keeping cattle to keeping camels and goats. There is a marked trend towards keeping more small ruminants as proportion of livestock holdings than large ruminants. There are many reasons for this; goats are relatively cheap to acquire and reproduce quickly, enabling pastoralists to use them as a means to acquire cattle or camels (Peacock, 2005).

The social and economic roles goats play in African rural societies are explained in terms of food security and income generation. Since crop yields plateau and the price of many cash crops stagnate or fall, the intensification of livestock production is a viable option to increase household income. They are considered as savings account, especially for women in rural areas. Small ruminants are much easier and quicker to sell than cattle, when cash is needed to meet households' requirements. Now, more specialized systems of goat production are developing in response to increased market opportunities. The growing demand for goat meat from city residents presents an opportunity for goat fattening systems, as well as improved marketing from pastoral flocks. The potential for goat meat export, particularly to Middle East markets, remains under-exploited. Droughts are common and even floods can devastate lives as can civil war. Frequently families

have to face crises due to accident or illness, increasingly from HIV/AIDS, without the benefit of a formal welfare system. Goats can play a vital role in supporting families through all these situations (ibid).

Small ruminants are often slaughtered in honour of a special guest, a visiting friend or relative, for festivities and religious rituals. More importantly, small ruminants play a key role in stock association building (building social capital or harmonizing relationships) between non household members in rural areas. Because of their small size, sheep and goats provide more convenient sources of meat than cattle. Small ruminant production in general, and sheep and goat production in particular, has in recent years gained increasing popularity in most of the developing countries. Apart from the social and economic functions small ruminants play in developing societies, they also provide most of the meat supply for human consumption. Increased demand for goat meat, for example, provides potential economic advantages to farmers of small ruminants over large ruminants (McDowell and Bove, 1977).

3. PASTORAL AND AGRO-PASTORAL INDIGENOUS HUSBANDRY PRACTICES AND ITS LIMITATIONS

Transformation of small ruminant production systems in arid areas under present demographic pressures and economic changes lead to an increase in human settlements, sedentarisation, which is associated with more demand for cultivation land. As the population becomes more and more sedentary, the amount of agro-pastoralism increases. The environment is probably too variable to support an agro-pastoral system. All these factors related to the transformation of the pastoral systems make the systems heavily dependent on external feed resources and agricultural byproducts. These transformations concern also feeding and the choice of raised breeds. During periods of droughts, contributions of range lands might be even lower. Along by-products (straw, stubble) are offered, which make the system heavily dependent on with this reduction in the contribution of range lands, other external resources and agriculture. However, the environment is probably too variable to support an agro-pastoral system. The dynamics of the pastoral systems induces also changes in livestock composition, less goats and more sheep and cattle. Zero grazing system induces problems of pollution (A. El Aicha and A. Waterhouseb, 1999).

The goat production system as a part of the existing broad crop-livestock mixed farming system of the selected villages is further described as follows. Indiscriminate breeding is prevalent in the area. No efforts seem to have made to improve the stock through selective breeding or by introducing high potential breeds. Male goats are taken better care of than the female ones as these fetch good price to the owners. Many do not like goat milk; hence, less priority is attached to milk traits of the goats. Feeding seems to be the most neglected aspect in goat production in the area under study. Goats were maintained on grazing in harvested fields, along the roadside and on other uncultivated/ barren lands. Stall-feeding in goats was very limited. Female goats are given kitchen waste and the males are given inferior quality grains and grams for fattening purposes. Children and old members take goats for grazing in nearby fields in the morning and also in the afternoon. Those households, which do not have children or aged members in their families, hardly keep goats. The farmers did not report disease in goats as problem. Since goat production is only a fringe activity for most of the farmers, the health problems of goats were hardly paid any attention. However, to find out the types of health problems in local goats, the information maintained in the

register of Indian Veterinary Research Institute run weekly clinic at Rithora was also studied. This revealed that goats suffered mainly from worm load, mange, mineral deficiency, anorexia, contagious ecthyma, diarrhea, mastitis etc (H.P.S.Arya and Mahesh Chander, 2003).

Using their own indicators of pasture type and quality, livestock-keepers decide whether or not they will go (or send their animals) on transhumance or will bring in feed from elsewhere. Studies of “grassroots” indicators mention of how pastoralists recognize range degradation, in the day-to-day management of range resources, pastoralists’ monitoring practices are reportedly much the same as in scientific range management: they monitor vegetation cover and yield, greenness of plants, vegetation composition, occurrence of wildlife, and indicator plants for degradation. However, pastoralists do not monitor vegetation, water or soil because they are primarily interested in these resources but rather because they are interested in how their animals and their families fare from these resources. Therefore, changes in the state of natural resources are more likely to be monitored through changes in the condition (health, productivity, well-being) of their animals. For this reason, indicators associated with their animals (e.g. milk yield, energy levels, sleekness of skin) are likely to be more important to monitor than, e.g. vegetation (Wolfgang Bayer and Ann Waters-Bayer; 2002).

The incorporation of the pastoral production system into the market economy and the efforts of so called developmental policies to shift traditional resource tenure to state tenure have among other things, contributed to land degradation. It also contributed to the erosion of traditional social structures and the cohesion of nomadic pastoral societies. The widespread feeling is now that the spirit of cooperation and collective responsibility that was once central to traditional animal husbandry has been lost and is being replaced by individualism, greed, mistrust and competition. The mobility of households and herds is a distinctive adaptation to this risk prone environment. Restrictions on mobility affect livestock production, rangeland ecology and inter-group relations. Starting with Somalia’s independence in 1960 and the creation of permanent water points in arid zones such as Haud, grazing patterns and cyclical migrations have been altered. As water points alleviated one problem, it created an even more serious one. Areas that previously could be grazed only during the wet season could now be grazed all year round. Migrations became more localized and the range was given little time to regenerate. The availability of water meant that animals could be watered more frequently, and did not need to move far from the water points. There is a dilemma; namely that more water points are a necessity for the short term, yet more water points will compound the problems of declining pasture and declining livestock production. Proper management of new water sources is therefore essential. One possibility would be to consider ways of restricting new berkedes to existing centres and thereby to conserve grazing areas (Sabine Homann et al 2004).

Herd mobility as crucial strategy: Since the functional distinction between different ecological zones was no longer valid, the rotational grazing was abandoned. Throughout the Borana lowlands the adjustment of stocking rates to forage availability necessarily decreased. Borana pastoralists differentiate breed types for cattle, small ruminants and camel in *Qorti* and *Ayuna*. They identified the scarcity of pasture and the increasing recurrence of droughts as the main causes for the genetic erosion. In response to ecological degradation and the declining competitiveness of the Ethiopian Boran cattle, pastoralists have increasingly started to complement cattle husbandry with that of camels. The pastoralists complained that all livestock species had reduced their reproductive

performance. Indicators for low performance were said to be the insufficient supply of milk and a delayed conception (Sabine Homann et al 2004).

4. RESEARCH METHODOLOGY

4.1. THE STUDY AREA

Dugda Dawa Woreda is situated in Borana zone of Oromia region some 500 km south of Addis Ababa. The total land area of the Woreda is estimated to be about 165,633 hectare of which 56,197 hectare is cultivated, 28,308 hectare is covered with forest, and 75,600 hectare is pasture land. The altitude of the area ranges from 1100 to 1750 meters above sea level. The mean annual temperature ranges from 17 °c to 27°c and a prominent feature of the ecosystem is the erratic and variable nature of the rainfall, with most areas receiving between 450 mm and 900 mm annually.

The total population of the Woreda is 94270 (male 48106 and female 46164). The dominant ethnic group is Oromo (CSA Population Projection 2010).

Livestock production is the major components of the farming system in the study area and contributes to the subsistence requirement of the population, among other, in terms of milk, and milk products and meat, particularly from small ruminants. According to the district Agricultural and Rural Development Office (2010), the Woreda's total population of livestock is estimated to be 444,317. Among this, cattle population accounts for 79.76% followed by goat 11.16% and the remaining was 9.08%.

In general, the Woreda is designated as famine prone and frequent crop failure is a common problem usually leading to food shortage. Drought induced food insecurity has been a common recurrent phenomena exacerbating the vulnerability of resource poor rural households in the area to be food insecure.

4.2. SAMPLING TECHNIQUES

A purposive sampling design was employed in selecting survey sites, to include both agro-pastoralists adoption behavior. The agro-pastoralists were assumed to use more of small ruminants fattening package than the pastoralists. Sample size was determined to be 160, of which 100 respondents were adopters and 60 respondents in the non-adopters group. Dugda Dawa woreda is broadly divided into agro-pastoral and pastoral production system. Site selection was in accordance with the existing production system, four PAs were used in the primary data collection process. Among the PAs, three agro-pastoral and one pastoral PA were selected using relevant criteria. Three of these survey sites are agro-pastoral while one is pastoral PA so that samples would represent the whole woreda.

The sampling frame for the study was prepared for adopters and non-adopters from WBRDP and NGOs record list of several years. Adopters were sampled from a list prepared independently from WBRDP records for five years in various activities specifically related with small ruminant rearing. A complete list of all kind of extension service participants was prepared by the researcher to capture the full package components users in the village (extension services-agricultural education, training, demonstration, farm visit participants list, fodder and forage plant seed

distribution list, supplemental feeds distribution list, veterinary service records) from the office to proportionately sample the adopters. Non adopters list were also prepared from the PAs council office through DAs working in each PA. Non adopters were sampled again proportionately to their PAs household size excluding the adopters in each PA already sampled from the list. All the samples were taken using simple random sampling technique proportional to their size.

However, the final sample size was 151. Two out of 100 adopter respondents and seven out of 60 non adopter respondents could not respond due to imprisonment, relocation from the village and few also had already started to migrate with their flocks in search of feed to rangelands during the survey period. A replacement for these missing sample respondents was not done for unavoidable reasons such as insecurity, time shortage, and resource/transportation and facility constraints.

4.3.DATA SOURCE AND METHOD OF DATA COLLECTION

Both primary and secondary sources were used to obtain qualitative and quantitative data. Data that were generated from interview schedule and secondary sources covered households' demographic characteristics, institutional settings like extension system, market and prices, participations in informal and formal organizations, trainings delivered by GOs and NGOs, economic status, socio-psychological aspects like perception, attitude and knowledge of the respondents, the bio-physical resources such as feeds, range lands and water in connection with the fattening enterprise.

Qualitative data collection methods were also employed to supplement and elaborate on marketing and cooperative, gender and small ruminant practices' management and informal information source and communication sharing issues. The qualitative methods of data collection used in the study include focus group discussions among adopters and non-adopters, informal discussions with females and village elders, transect walk and observation in the village.

Before administering actual interview schedule general observation of the woreda, informal discussions with the agro-pastoralists, transect walks in most of the PAs during three weeks of first survey period and pilot study were undertaken. The pilot study was done in 3 PAs which were not used for actual survey but these PAs were adjacent and have similar characteristics with PAs selected for the survey so that comparison of information obtained is reliable and informative. The number of samples used for pilot study was 20 and was selected randomly. The purpose of the pilot study was to refine the interview schedule, delete ambiguous questions and add more relevant items. Cross checking the survey interview schedule with secondary sources, personal observations and focus group discussion information were made. Data entry was done using SPSS version 12 software, after coding, tabulation and cleaning the data collected through the survey.

4.4.METHODS OF DATA ANALYSIS

Descriptive statistical analysis methods were employed to discuss the result of survey using central measures and measure of dispersions, frequency, mean, average, variances, percentages, besides mean comparisons of independent samples and relation of sample category with variables in questions. The t-test and χ^2 -tests help to see the presence of statically significant differences or systematic association respectively, between those who adopt and those who do not in terms of

some hypothesized variables. Descriptive statistics in such a way give some insight about the characteristics of sampled units for the survey study.

Agro-pastoralists' liking or disliking of small ruminant fattening package is the result of their own evaluative perception. Perception was measured using a scale with items developed for the purpose of this study. Attitude responses of sample respondents on small ruminant fattening package were collected following five point Likert type attitude scale. Positive statements were rated 5 to 1 (strongly agree to strongly disagree) and scoring pattern was reversed for negative statements. Then the total attitude score was worked out for each respondent. A sum of all responses for a respondent becomes a total score which is suitable for analysis using t-test and measure of dispersion to characterize the sample respondents.

Tobit model was employed to see the intensity of adoption of the package in the village. According to Gujarati (1995) this model helps to examine the factors affecting adoption and intensity of use after the practice is adopted simultaneously. The Tobit model, therefore measures not only the probability that an agro-pastoralist will adopt the new practice but also the intensity of use once it is adopted or of the introduced technology. Therefore a direct application of the Tobit estimation sufficiently provides the needed information on the probability and intensity of adoption of fattening package.

5. RESULT AND DISCUSSION

5.1.AWARENESS OF SAMPLED RESPONDENTS ON SMALL RUMINANTS' FATTENING PACKAGE EXTENSION SERVICES

Among the respondents, 61.2 % of adopters and 22.64 % non-adopters were aware of the existence of small ruminant extension package, while 38.8 % of adopters and 77.36% of non-adopters confirmed that they were not aware of extension services. It was also seen in this study, there existed statically significant differences between adopters and non-adopters in their being aware of small ruminant extension services in the woreda (Table 1). During informal group discussion, agro-pastoralists asked the extensions services a lot of information related with small ruminants' production. Awareness level of small ruminants' extension services of adopters is better than non-adopters. Adopters have better exposure to extension agents and services and thus, would give higher value and recognition to the extension services. Therefore adopters are far more ready to seek new knowledge and information on technologies from the extension services as they are aware of small ruminant extension services in the woreda.

5.2.THE MODEL RESULT

Among explanatory variables hypothesized to influence agro-pastoralists in the intensity of fattening package adoption, using descriptive statistics, about half of the variables were found to have significant effects on adoption decision during descriptive analysis. A further econometric analysis was done to see the degree of influence empirically of explanatory variables on the independent variable (intensity of adoption).

Estimates of the parameters of the variables expected to determine the intensity of adoption decision of fattening package are shown in Table 2. A total of 9 explanatory variables were

considered in the econometric model out of which five variables were found to significantly influence the intensity of small ruminant fattening package use among farm households.

TLU holding of the household head is the major indicator of wealth as well as social status more over risk taking behavior. In the above table, it was shown that TLU holding is positively related to intensity of adoption decision (10 % significance level). A larger holding of TLU affects the sample respondents' probability to intensively adopt the fattening package practices in the woreda. This is may be TLU holding increases agro-pastoralists risk assumption in adopting new practices and also the goal of increasing income level of the households, HHHs may engage in small ruminant fattening which is relatively has immediate remuneration by shifting some of available small ruminants because of larger TLU holdings.

Farmers who have access to credit can overcome their financial constraints and therefore buy inputs using the available credit. Farmers without cash and no access to credit will find it very difficult to attain and adopt new technologies. Access to credit for veterinary purpose (CREVET) was negatively influencing the probability of intensity of small ruminant fattening package (significant at 10% level). The change in the amount of access to credit for veterinary purpose of agro-pastoralists small to large decreases the probability of the credit used to keep their small ruminants health. This implies that very small proportion of adopters had access to veterinary credit and this credit access is also concentrated for only few socially active villagers (PA councilors and local group leaders). Hence credit given to agro-pastoralists could face diversion from its intended purpose, as the majority of credit users are having higher TLU, which implies that large ruminants are more in proportion than small ruminants.

The current management practices of agro-pastoralists are one of the most important factors that were assumed to affect intensity of adoption positively. If improved managements practices are convenient and fit to ones practices, the individual is likely to use the package more intensively. The result supports this assumption in that adoption score of management practices is positively and significantly influences extent of fattening package adoption in the study area (significant at 5 % level). In the results, it is shown that as higher adoption score of management practices increases the probability of intensity of adoption of the fattening package. The result confirms that the more the fattening package management practices nearer to the current management practices of ago-pastoralists and pastoralists management practices, the more convenient it would be. Management practices and agricultural technologies are very closely related factors in any production activity. There is an established theory that emphasize on technological convenience to farmers' management practices by shoemaker (1971) and then after many findings have shown that convenience of technologies and management practices positively affect adoption decision (Saha *et al*; 1994).

Perception on availability of a particular technology and improved methods and its profitability are another economic dimension of agro-pastoralists' perception that affects extent of use decision for specialization, for example, small ruminant fattening can be directly affected by individuals' selection of breed and other basic technologies for fattening. As hypothesized in the variable definitions, perception on components of fattening package has positive and significant influence on intensity of adoption decision.

The empirical result of the study also found out that perception on the availability of improved breed is positive and significant at 10 % level. The stronger the perception of agro-pastoralists on the availability of the improved breed, the more he uses selection of breeds for fattening and the more extensive adopter of fattening package he would be and vice versa. The extent of fattening package adoption decision increases by 0.8% as the perception on availability of improved breeds of agro-pastoralist and pastoralist increases.

The low magnitude of change in probability of adoption decision may be explained by perception is the resultant effects of several other factors which determine ones perception currently on specific technology. Ones' perception is a cumulative experience, knowledge and attitude in evaluation of the importance, sources, means, and implementation techniques of this technology. Perception of farmers on technologies selection and use has been found to positively and significantly affecting farmer's decision in the studies of (Guerin and Guerin, 1994).

Lastly, the point which remained to be discussed is that of agro-pastoralists' feeling on security of their locality due to resource competition. Conflicts are common in areas where scarce resources (water points and grazing or pasture lands) are needed equally by all members of the community and where these resources are common goods ("tragedy of the commons" theory of resource economics applies in such cases). Moreover, adoption decisions is not merely dependent on, usual characteristics like economical, social, demographic or physical technologies and biological, it has also political and security aspects.

The result of this study found that as it was hypothesized, that security problems due to scarce resources will influence intensity of adoption decision positively and significantly (10 % significance level). As the agro-pastoralists' feeling towards insecurity increases their decision on the extent of fattening package particularly feed and watering components increases by 1.6 %. This implies that as insecurity feeling increases, which arises from local conflicts due to scarce resources competition, agro-pastoralists and pastoralists decision to feed small ruminant under stall feeding, supplement and purchased feed would increase and also their management decisions could change accordingly. Adoption decision are influenced significantly by political and insecurity than tenure security.

6. CONCLUSION

Livestock in Ethiopia is the major source of income and means of livelihoods for most of the rural people after crop production. The importance of livestock in general and small ruminants in particular, has high significance for agro-pastoral and pastoral communities whose means of livelihood is partially and totally dependent on livestock production respectively. Contributions of small ruminants to rural people in economic employment and the value addition to farm outputs, food security, socio-cultural, and environmental sustainability through increase use of marginal lands, manure and farm waste are few of the recognized importance of small ruminants in rural smallholders' economy in Ethiopia.

Small ruminant production is undertaken among Dugda Dawa woreda agro-pastoralists extensively to large ruminants. The average holding of goats and sheep in household are 13.2 and 0.84 respectively. All sample households have more goats than sheep and there are few HH which do not own sheep. New market has emerged for livestock species especially small ruminants, cattle

and camel both in the country and abroad (Middle East) in the last 10 years. These new opportunities have motivated impact on agro-pastoralists' to rear small ruminants for market purpose. Thus changing their management practices and ways of their livestock keeping becomes mandatory to be competent in the existing market. In addition, several governmental and non-governmental organizations working for improvements of these communities have been making efforts to introduce, transfer and inform technologies and improved management practices in small ruminant production. This study tried to highlight agro-pastoralists evaluation of the extension services effort with respect to methods and contents of the small ruminant fattening package. Furthermore, the study focuses on identifying the factors that determine agro-pastoralists' decision on the intensity of adoption of fattening package in the woreda.

Descriptive results of the study show significant differences between adopters and non-adopters and the presence of relation between extent of fattening package adoption decisions and explanatory variables such as family size, small ruminant rearing experiences, TLU, market distance, current management practices adoption score, use of credit for veterinary purpose, access to market information, importance of extension methods, frequency of radio use, perception of agro-pastoralists on the availability of improved breeds, feelings of security by sample respondents' for the existence of conflicts due to scarcity of range lands and water points, risk orientation, knowledge of fattening package components and distance to input market.

Econometric results showed that among fourteen descriptively significant explanatory variables, only five have been found to be significantly affecting intensity of adoption of fattening package. Tobit model output showed that the most powerfully influencing explanatory variables that positively and significantly determine extent of fattening package adoption decision were perception on availability of improved breed (PERFIMB), current management practice score (ADOSCMGT) and total livestock holding (TLU) while access to credit for veterinary purpose (CREVET) and the distance of market from the households in terms of hours (RESCONFL) were negatively and significantly determining the extent of fattening package adoption by adopters in the woreda. Therefore, concerted efforts from all actors are needed to enhance the extent of fattening package adoption in the woreda.

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TABLES

Table 1: Sample respondents' distribution of awareness of small ruminant extension services

Responses for awareness of small ruminant extension services	Adopters		Non Adopters		χ^2
	N	%	N	%	
Yes	60	61.2	12	22.64	4.016**
No	38	38.8	41	77.36	

Source: own survey, 2010

** Significant at 5 % level

Table 2: Maximum estimates of Tobit model

S.No	Explanatory Variables	Estimated Coefficients	Standard Error	t-ratio	Change in probability $\frac{\partial(Fz)}{\partial X_i} = f(z) \frac{\beta_i}{\sigma}$
1	Constant	.72910706	.13212872	5.518***	0.231468
2	FAMLSIZE	.00981639	.00928573	1.057	-0.003116
3	SRREXPER	.00240434	.00172946	1.390	-0.000763
4	TLU	.00527537	.00317143	1.663*	0.001675
5	CREVET	.08522731	.04483951	1.900*	-0.027057
6	MARLENGHT	.02825610	.02031700	1.391	-0.00897
7	ADOSCMGT	.04439778	.00596294	7.446**	0.014095
8	PEREAING	.07055195	.05859947	1.204	0.022398
9	PERFPIMB	.02519846	.01405698	1.793*	0.008
10	RESCONFL	.05176619	.02950038	1.754*	0.016434

***, **, * Represents level of significance at 1%, 5% and 10%, respectively