



Review Article

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# Factors Determine Beef Cattle Production and Value Addition in Dawuro Zone (Essara and Maraka Districts) SNNPR, Ethiopia



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## Abstract

In the agriculture sector beef cattle sub-sector plays a great role by employing many task forces in agrarian countries and serve as source of income and food. Ethiopia's predominant source of animal feed is natural pastures, forages and browse of varying nutritive value. These feeds are generally communal or are communally administered. "Value added" means adding value to a raw product by taking it to at least the next stage of production. Beef cattle production, marketing and value addition issues are yet not well addressed through scientific approach in the study area. To address these problems this study was conducted in Maraka and Essara districts in Dawuro Zone, Southern Ethiopia with general objective of analyzing factors determine beef cattle production and value addition in the study area. The random sampling procedure is used to select sample respondents such as 130 beef cattle producers from 9 rural kebeles, 16 beef cattle traders and beef retailers. Primary data are collected from sample respondents through questionnaires and checklists and secondary data are also used. Financial position indicators like value share and value-added calculations are included. Statistically significant variables in probit model analysis for factors determine the accesses to veterinary service (drug) are years of experience in beef cattle production, age of household head, family size, land size, and other livestock at household head. In the case of access to feed and feed sources statistically significant variables are sex of the household heads, land size, market information and income from other sources. Percent of value added by beef cattle producers, traders and beef retailers on different sized beef cattle is well computed. Conclusions drawn are Encouraging savings of income obtained from other sources, improving access to veterinary services, providing trainings on improved beef cattle production, organized market linkage and value addition activities.

**Keywords:** Beef cattle; Value addition; Beef cattle production; Marketing

## Introduction

### Background

In the 21<sup>st</sup> century, agriculture continues to be a fundamental instrument for sustainable development and poverty reduction. Three of every four poor people in developing countries live in rural areas, 2.1 billion living on less than \$2 a day and 880 million on less than \$1 a day and most depend on agriculture for their livelihoods. Given where they are and what they do best, promoting agriculture is imperative for meeting the Millennium Development Goal of halving poverty and hunger by 2015 and continuing to reduce poverty and hunger for several decades thereafter. In the agriculture-based countries, which include most of Sub-Saharan Africa, agriculture and its associated industries are essential to growth and to reducing mass poverty and food insecurity. Using

agriculture as the basis for economic growth in the agriculture-based countries requires a productivity revolution in smallholder farming. The worlds of agriculture are vast, varied, and rapidly changing, with the right policies and supportive investments at local, national, and global levels, today's agriculture offers new opportunities to hundreds of millions of rural poor to move out of poverty [1]. As farmers struggle to find ways to increase farm income, interest in "adding value" to raw agricultural products has grown tremendously. The value of farm products can be increased in endless ways: by cleaning and cooling, packaging, processing, distributing, cooking, combining, churning, culturing, grinding, hulling, extracting, drying, smoking, handcrafting, spinning, weaving, labeling, or packaging. Besides offering a higher return, value added products can open new markets, create recognition for

a farm, expand the market season, and make a positive contribution to the community. For producers, capturing value usually means capturing some of the value added by processing and marketing. Marketing directly to the consumer can be done on a small or large scale and in a variety of ways. Options for the producer who enjoys direct contact with consumers include selling at farmers' markets and through community supported agriculture systems. Other options include sales directly to restaurants and local institutions, as well as mail order and Internet sales [2].

The agricultural sector of Ethiopia accounts for about 42% of GDP and between 80-85% of employment (MoFED 2012). The livestock subsector is also already a major contributor to the overall economy. The livestock sector contributes 19% of the GDP, and 16-19% of the foreign exchange earnings of the country (MoA 2012). The livestock sector can also be a major contributor to poverty reduction by improving the livelihoods of rural people. Approximately 85% of Ethiopia's population is rural based, and livestock supports the livelihoods of about 80% of rural people (ILRI 2011). However, the income of 30% of the rural population is below the poverty line (MoFED 2013, cited in Barry I Sh., et.al. [3]). Value-added agriculture is a portfolio of agricultural practices that enable farmers to align with consumer preferences for agricultural or food products with form, space, time, identity, and quality characteristics that are not present in conventionally produced raw agricultural commodities. Value-added agriculture can be characterized by farmers changing their position on the supply chain, creating closer or direct linkages between themselves and consumers, or changing production processes to alter or preserve certain intrinsic characteristics of their farm/ranch products [4]. But the agriculture sector overall performance of the world in general and the developing countries are yet not doing promising activities to feed most of the world population who highly depends on such less responsive production proceeds of the sector. This low performance of the sector is clearly due to less attention given to agriculture in subsistence farming practicing countries, lack of knowhow on value addition practices at each stage of production and processing and also absence of strong government policies to change or upgrade the backward farming system in most of the developing world.

The Southern Nations, Nationalities and Peoples Region (SNNPR) has a huge number of livestock population. Of which with the current estimate of the cattle constitutes about 7.5 million and the report trends for cattle population in the region indicated that it slightly increasing starting from 1997 but productivity is very low (BOPED, 2002). Dawuro is one of zones in the region and it has a total of 313,094 cattle population (CSA 2006).

### Statement of the Problem

Farmers in general in the region and particularly in the study areas are mostly engaged in subsistence farming system which is characterized by low production and productivity, poor access

to markets, supporting services and poor cooperation among the main value chain actors. It is, however, possible for smallholder farming to survive economically when given a set of opportunities to different inputs and support services. Total cattle population of the Dawuro zone is 313,094 (CSA 2006). However, productivity of these livestock per head is very low as compared to the potential of the zone. This is mainly due to shortage of improved breeds, diseases pressure, feed shortage, and limited grazing land (Zonal Bureau of Agriculture, 2013). There is no market information on prices and supplies, nor formalized grades and standards in the country including the studied districts [5]. Smallholder livestock productions of the studied districts are characterized with high mortality, low fertility, and lower productivity and inaccessible to incentive markets and credits are characterized as inefficient system [6]. It is also essential to develop a value chain intervention of livestock marketing which helps to understanding problems of market access, distribution of gains along the chain, nature and determinants of smallholder competitiveness in market chains and find leverage points for designing and implementing appropriate development programs and policies that enhance market participation of smallholder producers in the districts [7].

All actors at each stage of agricultural products production activities try to add value in different ways such as making form or size change on original product and by packing, labeling and transporting the product from its production area to where users need it. These all value addition practice brings the product ready for the consumers at right place and time based on their interest. But most of the time all those efforts of the actors who add value on the product has not been acknowledged and considered. Therefore, this study aims to fill information gaps in determinants of beef cattle production, value addition activities and products marketing in Dawuro zone (Essara and Maraka Districts).

### Objectives of the Study

#### General objective

The general objective of this study is to analyze the factors determine beef cattle production and value addition in Essara and Maraka Districts in Dawuro Zone.

#### Specific objectives

The specific objectives of the study are the followings:

- a) To assess value addition practices on beef cattle in the study areas
- b) To analyze the factors, determine beef cattle production and marketing in the study areas

### Research Questions

This study aims to answer the following key research questions.

- a) What are the different value addition practices on beef cattle?
- b) What factors determine the production and marketing of beef cattle in the study areas?

## Literature Review

### Value addition on Agricultural Products

“Value added” means adding value to a raw product by taking it to at least the next stage of production. This can be as simple as retaining ownership of your calves and wintering them on wheat pasture or placing them in a feedlot. In fact, adding value to agricultural products beyond the farm gate usually has several times the economic impact of the agricultural production alone. Agricultural producers receive a much smaller portion of the consumer’s dollar than do food processors. Creating customer value is critical in building a profitable and substantial business. However, one must bear in mind that it is the customers’ perception of value, not the producers’, that is critical. Consider the case of pre-conditioning calves. Does the cattle buyer perceive the preconditioning program as adding value? That is, will the buyer pay more for preconditioned calves (enough to cover the added costs) than for other calves? [8]. The Livestock Master Plan, Volume F (2008), and expert interviews, agree that annual non-salary expenditure (drugs, equipment, and transport) on animal health in Ethiopia is currently between ETB 200,000 and 800,000, as opposed to the recommended level of at least ETB 1.5 million. When considered on a per animal basis total spending (salary and non-salary) the total is just under ETB 1/animal, compared to recommended levels of ETB 31. Currently private veterinarians make up a small proportion of the total animal health workers. Private drug distributors (who typically hire the private veterinarians) compete periodically with government subsidized drugs. The inconsistent availability of government-supplied drugs prevents private companies from developing their rural distribution networks. Expert interviews and field visits indicate that a typical rural vendor can expect to collect revenue of ETB 8000/month on when not competing with discounted drugs, but only ETB 1200 when the enterprise must compete with discounted government drugs. This study found that penetration of private drug vendors is extremely low in Ethiopia when compared to other countries in the region [9].

Any business enterprise can be thought of as a value chain. Each activity that is performed should add value to the product. To do this, one must meticulously control the activities at each step in the value chain: procurement of inputs; converting inputs into products; marketing and sales; supply chain logistics; and customer service activities. A new value-added business should focus on the product’s uniqueness. The uniqueness of your product or service (the value you add) is what ultimately attracts customers. Obviously, this value-added strategy is very different from the commodity-oriented strategy with which most farmers and ranchers are familiar. In a commodity strategy, a producer

focuses on the costs of production with the goal of being a low-cost producer. This is a “supply-side” focus. The value-added strategy, in contrast, involves a “demand-side” focus on determining who the customers are and what they want. Then, after assessing your resources and source of uniqueness, you provide a product or service that efficiently curbs production costs while meeting the needs of the potential market. Unlike a commodity-driven business, a value-added business cannot erode benefits or lower input specifications just to lower costs.

### Beef Cattle Production and marketing in Ethiopia

Ethiopia’s cattle herd structure features relatively high male representation (44.5% of the population), and the largest proportions for both sexes fall into the 3–10-year age category. This is an indication of the uses to which the animals are put: oxen for cultivation and cows for milk production. Of the 27% of male cattle of over three years of age, about 90% are thought to be used as draught power, although this figure is dominated by highlands’ practice. It is generally thought that in the highland mixed farming areas, cattle are raised primarily to provide bullocks for draught purpose, and that meat and milk are secondary products. In contrast, lowland pastoral areas feature cattle for milk and meat production. Ethiopian cattle off take are low by East African standards, and low in relation to off take for other species [10]. Ethiopia is ecologically diverse, featuring 18 distinct agro-climatic zones, but it has two major recognized livestock production systems: highland with predominantly mixed farming; and lowland pastoral and agro-pastoral systems. Ethiopia borders half a dozen countries in the Horn of Africa, and in all cases cultural, linguistic, clan and family links span the boundaries. Such connections employ physical and organizational trading arrangements that predate modern frontiers and serve Middle Eastern markets for imported cattle and beef.

Domestic markets can be classified into basic/primary ‘bush’ markets, primary assembly markets, secondary markets for distribution and terminal markets in demand centers. Bush markets are attended by producers both as sellers and buyers and commonly intermediated by brokers, with purchase being primarily for replacements and rarely for fattening. Traders dominate purchases at assembly markets, and sales into secondary and terminal markets. At production level, and to an unknown extent at various market levels, brokers mediate transactions. Purchases for fattening and for slaughter occur at secondary or terminal markets. Feedlots purchase for fattening on a somewhat large scale, while household fattening units (primarily in highland mixed production systems) fatten retired draught oxen without purchasing in markets. Butchers tend to buy primarily (directly or via a trader) from household fattening units. Ethiopia’s predominant source of animal feed is natural pastures, forages and browse of varying nutritive value. These feeds are generally communal or are communally administered. These feature strong seasonality in supply, as rains are bimodal in many parts of the

country, but highland and lowland areas have differential rainfall patterns. As a result, traditional patterns of seasonal livestock movement have persisted. Grazing as a source of feed has been continuously declining as a result of increased areas of cultivation and changing patterns of fallow. The resultant crop residues from farming, and by-products such as straw, are becoming increasingly important sources of feed in crop producing areas as are stubbles and other crop residues. Haymaking for commercial sale is practiced in certain high-demand locations such as in urban and semi-urban dairy producing areas. Despite the presence of a vibrant grain industry for human consumption, concentrate feeds from whole grains are little used in Ethiopia, possibly due to the lack of any surplus over requirements for human consumption. Concentrate feeds formulated from by-products of flour and oil mills are used but are not common [9].

## Research Methodology

### Description of the study areas

**Dawuro Zone:** Dawuro lies in between 60 36' to 70 21' north latitudes and 360 68' to 370 52' east longitudes. The Gojeb and Omo rivers circumscribe and demarcate Dawuro from northwest to southwest in a clockwise direction. Dawuro shares boundaries with Konta Special Woreda in west, Jimma zone (Oromiya Region) in northwest, Hadiya and Kambata-Tambaro zones in northeast, Wolaita zone in east and Gamo Gofa zone in southeast. Dawuro has an area of 4,436 km square it has five districts, and one Town administration namely Essara, Tocha, Maraka, Genabosa, Loma and Tarcha Town Administration. The landscape of Dawuro is mostly mountains, plateaus, deep gorges and low land plains. Some of the mountains are Essara, Shasho, Sharo, Gugi, Gazo, Gumati, Hayo, Athso saddle mountains, Hathsinga and Gulo. The plateau cover areas extend from Gora upland in Loma district to the border of Konta Special Woreda in east-west direction and from Waka town to the confluence of Zigna, Mansa and Omo rivers in north-south direction of Essara and Tocha districts. The altitude of Dawuro ranges, from 500 meter around the confluence of Mansa and Omo rivers in special area Bona-balala of Adabacho kebele in Essara District to 3,000 meters above sea level (m.a.s.l.) at Tuta in Tocha district. Agro-ecological distribution of Dawuro zone is Dega (highland) 3%, Woyina Dega (Midland) 41.4% and Kola (Lowland) 55.6%. Annual rain fall of the Dawuro zone is averagely ranges from 1201-1800mm and the average temperature ranges from 17.40 C-290 C (Annual statistical abstract of CSA and reported by BoFED of SNNPRS, 2014).

In 2014, the population of Dawuro nationality estimated to be 600,121 according to annual statistical abstract of CSA and reported by BoFED of SNNPRS and its population density is 135.28 people per square kilometer. The area under cultivation was estimated to be 100,395 ha of the total 446, 082 ha area of the Zone according to the zonal agricultural department unpublished data. The dominant crops growing in the study areas are Enset

(*Enset ventricosum*) maize (*Zea Mays*) coffee (*Coffea arabica*) wheat (*Triticumaestivma*) barley (*Hordeumvulgare*), pea (*Pisum sativum*), bean (*Phaseous vulgaris*), potato (*Solanum tuberosum*), Tomato (*Lycopersicum esculentum L.*), onion (*Allium Cepa .L*) and different fruits and root and tuber crops as well as spices and herbs according to Dawuro zone agricultural department socioeconomic data.

**Essara District:** Essara district is one of the five districts in Dawuro zone and it has total population of 79,508 out of this 40,183 are male and 39,326 are female and total households in the district are 16,226, according to central statistics authority (CSA) annual statistical abstract and geographical information system (GIS) data of bureau of finance and economy development of SNNPRS 2013. The district has 29 kebele and its population density is 76.2 people per square kilometer. Agro ecology of the district varies from low-land (500 meter a.s.l) in confluence of Mensa and Omo river to 2600 meter (m.a.s.l) in Bandaramariyam (Gudumu kebele) and the district including Dega or high altitude 24% (25,034.4 m<sup>2</sup>) Woynadega or mid altitude is 45.2% (47,148.12 m<sup>2</sup>) and Kola or low altitude is 30.8% (32,127.48 m<sup>2</sup>) and totally 104,310 m<sup>2</sup>. Land type and utilization according to the data obtained from Essara district agricultural office, seasonal crop land 19,646.3m<sup>2</sup> (18.84%), perennial crop land 8,252.31m<sup>2</sup> (7.9%), forest and bush land 32,005.4m<sup>2</sup> (30.68%), communal grazing land 9,999.43m<sup>2</sup> (9.59 %), potentially productive free land 21,003.6m<sup>2</sup> (20.14 %), non-productive land 4,501.3m<sup>2</sup> (4.32%) and water body and others is 8,901.62m<sup>2</sup> (8.53%). The study area in the Dega receives rainfall almost throughout the year, for 9 months and heavy rain comes between June and September. The mean annual rainfall is 1705.4mm at Gasa Chere Station while 1424.9mm at Tercha station. The maximum and minimum mean annual temperature is (22.3°C and 12.4°C) and (29.3°C and 16.8°C) in Gasa Chere and Tercha stations respectively (Mathewos et al., 2013a).

The Essara district is highly potential and practicing beef cattle production and marketing as compared to other districts in Dawuro zone. The district has a total of 40,826 cattle population and of this 30,274 are beef cattle. Annual marketed beef cattle in the district are 24,000 and beef cattle marketed outside the district are 16,200 (CSA, 2013). Therefore, of 29 kebeles in the district, the top four beef cattle producing kebeles are purposefully selected for this research due to their potential and actual practices for beef cattle production and marketing.

**Maraka District:** Maraka district is one of the five districts in Dawuro zone and it has a total population of 145,955 and out of this 71,808 are male and 74,147 are female and total households in the district are 24,786, according to central statistics authority (CSA) annual statistical abstract and geographical information system (GIS) data of bureau of finance and economy development of SNNPRS 2013. The district has a total of 37 kebeles and the district is geographically distributed into three geographic zones and namely Dega (high land) 41.77%, Woyina Dega (Mid land) 50%

and Kola (Low land) 8.23%. The study area in the Dega receives rainfall almost throughout the year, for 9 months and heavy rain comes between June and September. The mean annual rainfall is 1705.4mm at Gasa Chere Station while 1424.9mm at Tercha station. The maximum and minimum mean annual temperature is (22.3°C and 12.4°C) and (29.3°C and 16.8°C) in Gasa Chere and Tercha stations respectively (Mathewos et al., 2013a).

The Maraka district is highly potential and actually practicing district next to Essara district for beef cattle production and marketing as compared to another district in Dawuro zone. The district has a total of 30,846 cattle and of this 16,000 are beef cattle. Annual marketed beef cattle in the district are 16,000 and beef cattle marketed outside the district are 10,000. Therefore, of 37 kebeles in the district, the top five beef cattle producing kebeles are purposefully selected for this research due to their potential and actual practices for beef cattle production and marketing.

### Type, Source and Method of Data Collection

Both qualitative and quantitative primary data were used for this study. These includes the beef cattle production and marketing, market supply of beef cattle and value addition, veterinary services provided at different levels of beef cattle production. The data was collected from sample respondents using questionnaire and checklists from primary sources. In addition to primary data, secondary data on beef cattle traders and beef retailers at district and Zonal towns, marketing agents and their role was collected from different sources. The sources of primary data are smallholder farmers, slaughterhouses, marketing intermediaries.

Secondary data sources are district Office of Agriculture, Trade and Industry offices at district and zonal levels, and different publications, internet browsing, etc.

### Sample Size and Sampling Techniques

Formal survey was conducted with beef cattle producers and the sample for this study was taken from farm household heads/farmers, beef cattle and its products traders. The sampling procedures are shown as follows.

**Beef cattle producers sampling:** A three-stage sampling procedure was adopted to select farm household heads for beef cattle production participation. After consultation and discussion with officials and agricultural experts at districts level, the first stage involved the purposive selection of 12 kebeles out of 29 total kebeles and 15 kebeles out of 37 total kebeles, respectively from two study districts (Essara and Maraka) based on their potential and actual practices for beef cattle production as compared to other kebeles in two districts. The second stage involves random sampling of 9 kebeles proportionally from two districts (i.e. a total of 4 kebeles among 12 selected kebeles in Essara district and 5 kebeles out of 15 selected kebeles in Maraka district was sampled randomly). The third stage involves the random proportional sampling of farm household heads from the sampled kebeles in the districts. Once the potential and practicing kebeles for beef cattle production are identified through random sampling procedure from the two districts proportionally 130 farm household heads/farmers were selected using random sampling procedure (Table 1).

**Table 1:** Summary of the Districts, Rural kebeles and Sample Size of Farm Household Heads.

| Name of Districts | Name of Kebeles | Total Household Size | Share of Sample from Total Sample Size (130) | Share in % from Total Sample Size (130) |
|-------------------|-----------------|----------------------|--|---|
| Essara            | Dale            | 620                  | 12   | 9.23                                    |
|                   | Arus Bala       | 548                  | 10   | 7.69                                    |
|                   | Duzi            | 778                  | 15   | 11.54                                   |
| Maraka            | Gudimu          | 792                  | 15   | 11.54                                   |
|                   | Samo            | 680                  | 13   | 10                                      |
|                   | Kawuka          | 820                  | 15   | 11.54                                   |
|                   | Mayila          | 740                  | 14   | 10.77                                   |
|                   | Tarcha Zuria    | 920                  | 17   | 13.08                                   |
|                   | Gasho           | 1020                 | 19   | 14.62                                   |
| Total             |                 | 6,918                | 130  | 100                                     |

**Beef cattle traders sampling:** Beef cattle traders were selected from two districts (Essara and Maraka districts). Sampling here is the very difficult task due to the opportunistic behavior of

the traders. However, based on the information obtained from secondary sources of two districts and zonal town, a total of 16 beef cattle traders were randomly proportionally selected (i.e.10

from two districts with equal share and the remaining 6 from zonal town). To make the sampling/selection of beef cattle traders' proportionally the larger share was taken from the district which has larger population of beef cattle traders as compared to the other districts.

### Method of Data Analysis

This study was used both descriptive statistics and econometric methods of data analysis.

**Analysis of factors determine the beef cattle production and marketing in the study areas:** An econometric model probit is used to identify factors determine access to feed and veterinary service (drug). These two inputs were analyzed separately in relation to households' socio-demographic, economic, intellectual and spatial characteristics. In addition to the model, descriptive statistics were also used to assess the supply and sources of feed and drug. For the individual cases, the probability of getting feed and drug supply can be formulated as binary choice model. This model can be analyzed using the probit equation below. The empirical specification of the probit model to be estimated by maximum likelihood estimation is defined as:

$$Y_i = \beta_0 + \sum_{i=1}^m \beta_i X_i + \varepsilon_i$$

Where:  $i = 1, 2, \dots, m$

$Y_i$  is a dummy variable indicating the probability of getting access that is related to the equation as  $Y_i = 1$  if a farmer has access to the inputs and services,  $Y_i = 0$ , otherwise.

$\beta_i$ , are the coefficients to be estimated,

$X_i$  is explanatory variables in the probit regression model,

$\varepsilon_i$ , is random error term

The probit functional form compels the error term to be homoscedastic because the form of probability depends only on the difference between error terms associated with one choice and other (Amemyia, 1985). The marginal effects would be estimated on the variable means. This calculation involves taking the partial derivatives that measures the change in the probability of getting access per unit change in the independent variables.

**Hypothesis and definition of variables:** The inputs namely access to feed and drugs were analyzed separately in relation to households' socio-demographic, economic, intellectual and spatial characteristics. The hypothesized explanatory variables and their expected relation to each input type are presented below.

### Dependent variables

**Access to feed and drug:** each input was analyzed separately. These dependent variables are dummy variables indicating the probability of getting access that is formulated as  $Y_i = 1$  if a farmer have access to the inputs and services,  $Y_i = 0$ , otherwise. Where  $Y_i$  is for each input; access to feed, and access to drug separately.

**Independent variables:** Independent variables are variables that are assumed to influence the household heads access to inputs for beef cattle production. The expected independent variables and their hypothesis for this objective are listed below.

**Family size (FAMSIZ):** It is a continuous variable and measured in number of persons of the household. Larger family size requires large amount for consumption, which reduces saving and liquidity. As a result, for such family size, buying inputs for beef cattle production was difficult unless the family has enough income sources. Therefore, the larger family size in relation to low level of income would determine the household heads access for inputs negatively and vice versa.

**Age of the household head (AGEHH):** It is a continuous variable. No priori sign is expected on this variable because it is both possible that the older farmers with more experience in production practices are more likely to recognize the gains from and on the contrary, being older may meant for more conservative and less likely to benefit from the production practices.

**Sex of the household head (SEXHH):** It is a dummy variable taking one for male headed and zero for female headed households. Both sexes may participate in beef cattle production. However, obstacles, such as lack of (capital, access to institutional credit, access to extension service,) may affect women's participation and efficiency in use of production technology [11]. Therefore, it is not possible to tell a prior about the likely sign of the coefficient of sex in the use of inputs for beef cattle production.

**Education level of the Household Head (EDHH):** Intellectual capital or education, measured in terms of formal schooling of household head, is assumed to have positive effect on the market participation and sale decision (Lapar et al., 2002). Education is believed to be an important feature that determines the readiness of household heads to accept new ideas and innovations [12]. According to Holvoet [13] education is an input in income since it provides the means of earning a higher income via enhancing earning capabilities. It is also a welfare outcome as it allows individuals to participate in decision making that determine the well-being. This is because educated households are more informed about sources, utilization and rising of financial funds for their better production. Therefore, it is expected to add positive effect towards the use and looking of access of inputs for beef cattle production.

**Land size in hectare (LASIHA):** This is a continuous variable measured in hectares of the total cultivated land holding of the household. This variable determines the decision to participate in beef cattle production and hence to the access of inputs and it is expected to have positive effect to the households' access to the feed if the household has enough land for grazing and otherwise negative.

**Income from other sources (INOTSOU):** This is continuous variable measured in birr for those who get income from other sources. This is an income that can be generated from other agricultural activities and off/non-farm sources by every member of the household. By improving savings, this income will increase the purchasing power of the household for further expansion and strengthen the households' ability to cope up different production risks. Thus; getting income from other sources is assumed to have direct relation with beef cattle production and access to inputs and use.

**Years of experience in production practices and inputs use (EXPFAPR):** it is continuous variable and it is measured in terms of the number of years of beef cattle fatteners' participation in production practices/marketing at household head level; and the more experienced the household heads in beef cattle production the higher would be the efficiency of farmers in the performance for access and use of inputs.

**Credit (CREDIT):** It is measured as dummy variable by taking one for those who have used credit and zero otherwise. If the credit obtained is used by the household efficiently, it would have positive effect on the accessing of inputs and otherwise negative. Therefore, this variable is assumed to have either positive or negative effect based on the credit use efficiency of the household heads.

**Access to Market information (MKTINFO):** This is dummy variable and taking one for access to the market information and zero otherwise. If there is good market information, farmers' decision to use the inputs would increase. Therefore, it is assumed that good market information is positively related with access to inputs (feed and drug) and vice versa. Study conducted by Goetz (1992) on food marketing behavior identified better market information significantly raises the probability of market participation.

**Other livestock's in TLU (OTHLIVSTO):** This is a continuous variable and indicates the number of other live animals measured in tropical livestock unit in addition to beef cattle at farm household heads. This variable is expected to have positive impact on farmers' decision to use and accessing inputs if others are managed well and the inverse otherwise.

**Relative financial position of beef cattle producers and other actors:** In this step value added by beef cattle producers, traders and beef cattle final user (hotel owners) would be computed and

their benefit share compared. Another aim of this step is to know about the financial position or how much each actor gain is from single beef cattle would be considered. The formula for computing value added by above mentioned actors is as follows:

$$\text{Value Share} = (\text{Added Value} * 100 / \text{Retail Price})$$

### Result and Discussion

The Probit model is used to analyze the factors determine beef cattle production and marketing and the analysis output is presented as follows.

#### Factors Determine Beef Cattle Production and Marketing in Dawuro Zone

#### Factors Determine Access to Veterinary Service (Drug) in Dawuro Zone

It is not questionable that the accesses to veterinary service determine the productivity of beef cattle sector. The access to veterinary service is determined by different factors in the study area. The major variables and their significance towards beef cattle production and marketing are shown in the table below via probit model analysis.

The model probability of chi-square is significant at less than 1% conventional level of significance to the access of veterinary services in the study area. The Probit analysis result in the Table 2 above shows that age of the beef cattle producers determines the access to the veterinary services, and it is significant at less than 5% significance level. Family and land sizes of the household heads are other significant variables at less than 1% conventional level of significance to the access of veterinary services in the study area and the hypothesized signs are as expected. Beef cattle producers' years of experience in beef cattle production in the study area is significant at less than 5% conventional level of significance to the access of veterinary services and positively related with the beef cattle production. This indicates that as years of experience in beef cattle production increases interest to participate again increase and also promising to pay back too. Another important significant variable at less than 1% conventional level of significance to the access of veterinary services is the presence of other livestock at producers' home and it is positively associated with the accesses of the services. As access to veterinary services gets improved the production of beef cattle improved too and supply of beef cattle to the market also increases due to there is positive association between the health of beef cattle and market demand.

**Table 2:** Probit Model Analysis Output for Access to Veterinary Service (Drug) in Dawuro Zone.

| Access to Drug | Coef.   | Std. Err. | dy/dx   | Std. Err. | P> z     |
|----------------|---------|-----------|---------|-----------|----------|
| Cons           | 9.4321  | 3.313     | -       | -         | -        |
| AGEHH          | -0.0675 | 0.0267    | -0.0024 | 0.0024    | 0.012**  |
| SEXHH          | -0.3677 | 0.1008    | -0.0108 | 0.0294    | 0.738    |
| EDHH           | 0.113   | 0.3714    | 0.004   | 0.0133    | 0.761    |
| FAMSIZ         | -0.274  | 0.1041    | -0.0097 | 0.0091    | 0.008*** |

|           |         |        |         |        |          |
|-----------|---------|--------|---------|--------|----------|
| LANDSIZE  | 0.4925  | 0.1366 | 0.0175  | 0.0162 | 0.000*** |
| MKTINFO   | -0.0613 | 0.1154 | -0.0258 | 0.0289 | 0.341    |
| CREADIT   | -0.5016 | 0.669  | -0.0178 | 0.0267 | 0.453    |
| EXPFPR    | 0.2368  | 0.1163 | 0.0084  | 0.0093 | 0.042**  |
| INOTSOU   | 0.0001  | 0.0001 | 0.0521  | 0      | 0.243    |
| OTHLIVSTO | 0.7352  | 0.3893 | 0.1324  | 0.1272 | 0.007*** |

Probit regression Number of observations = 130

LR chi2 (10) = 50.30

Prob > chi2 = 0.0000

Log likelihood = -30.6609 Pseudo R2 = 0.4506

**Factors Determine Access for Feed and Feed Sources in Dawuro Zone**

Beef cattle production is highly determined by feed and feed sources as compared to other variables. The Probit model analysis output for the access of feed and its sources for beef cattle production and its marketing in the study area is depicted as follows.

LR chi2 (10) = 39.71

Prob > chi2 = 0.0000

Log likelihood = -66.2731 Pseudo R2 = 0.2305

The model probability of chi-square is significant at less than 1% conventional level of significance to the access of feed and feed sources in the study area.

Probit regression Number of observations = 130

**Table 3:** Probit Model Analysis Output for access to Feed and Feed Sources in Dawuro Zone.

| Feeds     | Coef.   | Std. Err. | dy/dx   | Std. Err. | P> z     |
|-----------|---------|-----------|---------|-----------|----------|
| Cons      | 3.3959  | 1.5827    | -       | -         | -        |
| AGEHH     | -0.0186 | 0.0176    | -0.0073 | 0.0069    | 0.29     |
| SEXHH     | -0.4348 | 0.4683    | -0.4585 | 0.1135    | 0.002*** |
| EDHH      | -0.0309 | 0.1928    | -0.0121 | 0.0752    | 0.873    |
| FAMSIZ    | -0.045  | 0.0622    | -0.0175 | 0.0243    | 0.47     |
| LANDSIZE  | -0.2156 | 0.0829    | -0.0841 | 0.0324    | 0.009*** |
| MKTINFO   | 0.0758  | 0.4191    | 0.6384  | 0.0977    | 0.000*** |
| CREADIT   | 0.074   | 0.3259    | 0.0289  | 0.1271    | 0.82     |
| EXPFPR    | 0.0884  | 0.0779    | 0.0345  | 0.0304    | 0.256    |
| INOTSOU   | 0.0001  | 0.0001    | 0.0001  | 0.0001    | 0.000*** |
| OTHLIVSTO | -0.9929 | 0.9234    | -0.3874 | 0.361     | 0.282    |

Probit regression Number of observations = 130

LR chi2 (10) = 39.71

Prob > chi2 = 0.0000

Log likelihood = -66.2731 Pseudo R2 = 0.2305

The Probit analysis result in the Table 3 above indicated that both the sex of the beef cattle producers and land size of the household head are negatively associated variables with the accesses of the feeds and feed sources and they are significant at less than 1% conventional level of significance. Negative relationship between sex of the household heads and the access of feed and feed sources may be due to male and female headed

households' existence and their difference in feed access look up and feed management too. Market information for the beef cattle producers in the study area is significant at less than 1% conventional level of significance to the feed and feed sources and it is positively associated with the beef cattle production. This means that as the beef cattle producers gets market information about the feed and its source production will be improved and



supply of beef cattle to the market will be increased and thereby improvement in the income too. Another significant variable at less than 1% conventional level of significance to the feed and feed sources in the study area is the presence of additional income from other sources for the farm household heads which is positively associated with beef cattle production in the study area.

### Market Channels for Beef Cattle

The beef cattle must pass via different market channels from producers to the final beef cattle users/hotel owners. In the study area the possible market channels are mentioned as follows.

- a) **Channel-I:** Beef cattle producer/fattener → Wholesaler → Retailer/Hotel owner
- b) **Channel-II:** Beef cattle producer/fattener → Retailer/Hotel owner
- c) **Channel-III:** Non-beef cattle fattener → Beef cattle producer/fattener → Wholesaler
- d) **Channel-IV:** Non-beef cattle fattener → Beef cattle producer/fattener → Retailer/Hotel owner
- e) **Channel-V:** Non-beef cattle fattener → Beef cattle producer/fattener → Wholesaler → Retailer/Hotel owner

fattener → Wholesaler → Retailer/Hotel owner

Beef cattle producers can start beef cattle fattening process from two sources such as by buying non-fattened beef cattle from other producers or from his/her own source to fatten the beef cattle and then to sell it to the market. Of the above market channels in the study area, commonly practiced and well known are the first and fourth channels. According to the beef cattle producer's response in the study area the beef cattle producers are more benefited from the second and third channels this is due to the direct marketing system of the producer with the final beef cattle users/hotel owners. Market agents/brokers are there in between all the other actors in the market channels. In general, the actors who buy the beef cattle from the beef cattle producers are more benefited as compared to others in the study area.

### Beef cattle value addition calculation for different sized beef cattle in the study area

Value addition can be determined by different factors in the study area. The major determinants factors of value addition are the knowledge of value addition activities, time, place, method of inputs use and others. This means when to add? Where to add? How to add? Which inputs to use and so on are factors determine the value addition activities in the study area.

**Table 4:** Beef cattle buying price for slaughtering (Different Size).

| Beef Cattle Buying Price and Size of Beef Cattle | Study Area Towns in Dawuro Zone |      |           |         |
|--|---------------------------------|------|-----------|---------|
|  | Respondents                     | %    | Mean      | Std     |
| Small sized beef cattle                          |                                 |      |           |         |
| 8000   | 5                               | 31.3 | 8,562.50  | 512.35  |
| 8500   | 6                               | 37.5 | -         | -       |
| 9000   | 3                               | 18.8 | -         | -       |
| 9500   | 2                               | 12.5 | -         | -       |
| Medium sized beef cattle                         |                                 |      |           |         |
| 11000  | 6                               | 37.5 | 11,812.50 | 946.48  |
| 11500  | 4                               | 25   | -         | -       |
| 12000  | 2                               | 12.5 | -         | -       |
| 12500  | 1                               | 6.3  | -         | -       |
| 13500  | 3                               | 18.8 | -         | -       |
| Large sized beef cattle                          |                                 |      |           |         |
| 14000  | 4                               | 25   | 16,718.75 | 2065.34 |
| 15500  | 2                               | 12.5 | -         | -       |
| 17000  | 5                               | 31.3 | -         | -       |
| 18500  | 3                               | 18.8 | -         | -       |
| 20000  | 2                               | 12.5 | -         | -       |

Source: Survey result, 2016.

As the result in the Table 4 above indicated that, beef cattle buying price in the study area is different based on the economic status and interest of the buyers in the study area. In the study area the market/buying price of beef cattle depends on the size of the beef cattle. The average small, medium and large sized beef cattle buying price for slaughtering purpose in the study area are 8,562.50, 11,812.50 and 16,718.75 ETB, respectively. The size of the beef cattle is determined by the market price of the beef cattle

and vice versa. The other important thing to be further considered is that the color of the beef cattle also has the influence on the price of the beef cattle. But the color preference depends on the buyers of the beef cattle in the study area. According to T. Hines [14], (cited in Harko H), 2015 added value is defined as “the difference between output value and the input costs”. According to Abraham T. [15], (cited in Harko H, 2015) market margin is a sale price less purchase price whereas profit margin is sales price less total cost.

**Table 5:** Single Small Sized Beef Cattle Marketing price and Value-added Calculation.

| Items                      | Beef Cattle Producer | Beef Cattle Trader | Beef Retailer | Remark                                  |
|----------------------------|----------------------|--------------------|---------------|---|
| Costs detail               |                      |                    |               |   |
| Beef cattle purchase price | 5,600.50             | 8,260.25           | 10,565.80     |   |
| Feed cost                  | 862.28               | 35.25              | -             |   |
| Transport cost             | -                    | 30                 | -             |   |
| Market service cost        | -                    | 8                  | 8             |   |
| Slaughtering service cost  | -                    | -                  | 140           |   |
| Personal cost              | 50                   | 125.5              | -             |   |
| Total cost                 | 6,512.78             | 8,459.00           | 10,713.80     |   |
| Beef cattle selling price  | 8,785.25             | 9,950.65           | 11,565.55     | 4,615.87birr is the sum of value added. |
| Value added                | 2,272.47             | 1,491.65           | 851.75        | Value= added*100/sum of value added     |
| Percent of value added     | 49.23%               | 32.32%             | 18.45%        |   |

Source: Survey result, 2016.

As indicated in Table 5 above for small sized beef cattle; the beef cattle producers/fatteners, beef cattle traders and beef retailers as value chain main actor they have played a role in value addition activities. The percentage of value added by beef cattle producer, trader and beef retailer are 49.23%, 32.32% and 18.45%, respectively. From these figures the beef cattle producers

added more value on the product and their benefit or value share is equivalent to the total value added by the actors. But this may not work always because the market price and other price determinant factors determine the final gain of the actor who add value on his/her product.

**Table 6:** Single Medium Sized Beef Cattle Marketing Price and Value-Added Calculation.

| Items                      | Beef Cattle Fattener | Beef Cattle Trader | Beef Retailer | Remark                        |
|----------------------------|----------------------|--------------------|---------------|-------------------------------|
| Costs detail               |                      |                    |               |                               |
| Beef cattle purchase price | 7,650.55             | 9,956.35           | 12,100.00     |                               |
| Feed cost                  | 862.28               | 35.25              | -             |                               |
| Transport cost             | -                    | 30                 | -             |                               |
| Market service cost        | -                    | 8                  | 8             |                               |
| Slaughtering service cost  | -                    | -                  | 140           |                               |
| Personal cost              | 50                   | 125.5              | -             |                               |
| Total cost                 | 8,562.83             | 10,147.10          | 12,248.00     |                               |
| Beef cattle selling price  | 9,956.35             | 12,100.00          | 13,783.30     | 4881.72 is sum of value added |
| Value added                | 1,393.52             | 1,952.90           | 1,535.30      |                               |
| Percent of value added     | 28.55%               | 40.00%             | 31.45%        |                               |

Source: Survey result, 2016.

The result in Table 6 above indicates that the three main actors added value on the product at different stages. The value

added on medium sized beef cattle by beef cattle producer, beef cattle trader and beef retailer are 28.55%, 40.00% and 31.45%,

respectively and their value share or benefit is equivalent to the amount of value added by them. The percentage of value added on medium sized beef cattle by beef cattle trader indicates that the value share or benefit is higher than other.

**Table 7:** Single Large Sized Beef Cattle Marketing Price and Value-Added Calculation.

| Items                      | Beef Cattle Fattener | Beef Cattle Trader | Beef Retailer | Remark                         |
|----------------------------|----------------------|--------------------|---------------|--------------------------------|
| Costs detail               |                      |                    |               |                                |
| Beef cattle purchase price | 12,896.75            | 15,668.48          | 17,000.00     |                                |
| Feed cost                  | 862.28               | 35.25              | -             |                                |
| Transport cost             | -                    | 30                 | -             |                                |
| Market service cost        | -                    | 8                  | 8             |                                |
| Slaughtering service cost  | -                    | -                  | 140           |                                |
| Personal cost              | 50                   | 125.5              | -             |                                |
| Total cost                 | 13,809.03            | 15,867.23          | 17,148.00     |                                |
| Beef cattle selling price  | 15,668.48            | 17,000.00          | 19,133.58     |                                |
| Value added                | 1,859.45             | 1,132.77           | 1,985.58      | 4977.80birr sum of value added |
| Percent of value added     | 37.35%               | 22.76%             | 39.89%        |                                |

Source: Survey result, 2016.

The computation result in Table 7 above is different based on the stage of transaction and market price and its market and production factors. The percentage of value added on large sized beef cattle by producers, beef cattle traders and beef retailers are 37.35%, 22.76% and 39.89% respectively. The figures of value added indicate that the beef retailers have larger share and more benefited as compared to beef cattle producers and traders in the case of large sized beef cattle. This is may be due to large amount/volume of beef production in the case of the large sized beef cattle. The other important thing is that the beef cattle traders' value share is lower in this case as compared to the small and medium sized beef cattle marketing and value addition.

In general, the value addition computation indicated that in the case of small, medium and large sized beef cattle, respectively more value share or benefit has gone to beef cattle producers, beef cattle traders and beef retailers, respectively. The reason for this figure difference in three different sized beef cattle case demands further study and analysis by different scholars.

## Conclusion and Recommendation

### Conclusion

Agrarian countries in the world especially underdeveloped countries are mainly depends on agriculture for both food and income sources. Beef cattle production is one of the major agricultural practices in the study area where many rural people were engaged in it. Now a day's value addition is the core task in the world to increase the productivity as well as the food security issue of the world. But the beef cattle productivity and value addition issues are yet under question that these activities

are whether on the ways of world track or not in the study area specifically and the country in general.

Of the beef cattle production determinant variables in the study area, veterinary services and feed and feed sources are major ones. The probit analysis result indicated that age of the beef cattle producers and beef cattle producers' years of experience in beef cattle production in the study area are significant at less than 5% conventional level of significance. Age of the beef cattle producers is negatively whereas beef cattle producers' years of experience in beef cattle production is positively associated with the beef cattle production in the study area. Family and land sizes and the presence of other livestock at producer household heads are other significant variables at less than 1% conventional level of significance to the access of veterinary services in the study area. The sex of the beef cattle producer, land size of the household head, market information and the presence of additional income from other sources for the farm household heads are significant at less than 1% conventional level of significance to the feed and feed sources in beef cattle production. Therefore, these statistically significant variables must be considered for the future production level of the beef cattle sector.

Value addition computation from beef cattle producer to final beef cattle slaughterers indicated that there is variation in value added by actors and benefit share among the actors for different sized beef cattle. To make the varying value added and benefit share among the beef cattle producer to final owner beef cattle for the slaughtering purpose it requires continuous huge task to have balanced performance in value addition and benefit share of the beef cattle actors

## Recommendation

Beef cattle producers and other actors in the study area try their best to produce value added output and avail the product to the users at a time. But they have been challenged by the determinants of beef cattle production and have less awareness about the value addition activities on the beef cattle and its products. Therefore, the following basic things are recommended and expected to be taken under consideration by the concerned bodies in the study area.

- a) Awareness creation training on value addition activities should be given to the beef cattle producers and other actors in the chain by the concerned bodies.
- b) Agribusiness and value chain management professionals should play the role by sharing the knowledge of how to give due focus on value addition activities to beef cattle and its products by value chain actors.
- c) Different governmental and non-governmental medias in the study area should work with the Agribusiness and value chain management and Animal and Range science professionals to share the actual practice of value addition and understanding factors affect the beef cattle production.
- d) Value addition on each product is not a choice so that the issue must be taken under consideration by the responsible bodies at each stages of value addition activities on the products to make the product competitive in the market and thereby to make a profit.
- e) The local, regional and national level government bodies should give focus on the way of giving solution for factories determine the beef cattle production, marketing and value addition activities on the product.

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