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1	Camel Milk Marketing Channel Choices for Enhancing
2	Competitiveness in Eastern Ethiopia: Multinomial Logit
3	Approach
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8 Abstract

Literature on camel milk market channel choices has been thin, especially in pro poor 9 pastoral/agro-pastoral area of sub-Saharan Africa, as a result its prudent to note that none of 10 past studies identified factors affecting camel milk market channel choices in Eastern Ethiopia 11 even though camel milk market access is pivotal to transform livelihood of people who live in 12 arid and semi-arid areas of Ethiopia. Therefore, the study seeks to determine factors 13 influencing camel milk marketing channel choice in Gursume and Babile districts of Eastern 14 Ethiopia, with the aim of enhancing camel milk competiveness. Data was collected from 92 15 camel milk producers? pastoral/agro-pastoralist by using two stage stratified sampling. 16 Multinomial Logit mode was employed for analyzing data. Multinomial Logit model result 17 indicated that, compared to assembler market channel outlet (base channel), the likelihood of 18 accessing consumer market outlet was higher among pastoral/agro-pastoral who have higher 19 educational level, better livestock extension services, better milk market information and 20 higher income from none dairy source. The likelihood of accessing commission man milk 21 marketing channel choice was higher for households who wanted better milk price offered by 22 commission agent as compared to the base channel. Compared to accessing assembler market 23 outlet, likelihood of accessing retailer milk market outlet was higher for those who have better 24 dairy extension services and for those who were far away from milk market. The study reveals 25 to exploit the indigenous social capital of pastoral/ agro-pastoral to enhance milk marketing 26 supply chain, in addition to strengthening the formal institution (such as education, livestock 27 extension and develop milk collecting cooperatives) to increase the competitiveness of camel 28 milk market in semi-arid areas of Ethiopia and sub-Saharan Africa in general. 29

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31 Index terms— camel milk, marketing channels, multinomial logit, pastoralist.

³² 1 I. Introduction

thiopia is one of the richest countries in livestock inventory both regarding number and diversity. However, the benefit obtained from it is low as compared to other African countries. The livestock subsector comprised 24% of agricultural GDP between the year 1995/96 and 2005/06, and is a source of livelihood for 60 to 70% of

- the population (NBE, 2005/06), and accounts for about 12 to 15% of national export earnings ??EEA, 2005).
- $_{37}$ However, CPALD (2013) revealed that agricultural GDP calculations in Ethiopia underestimated the contribution

³⁸ of livestock to the Economy because the value of economic benefits that are derived from livestock power for

³⁹ farming and transport are not routinely included.

4 C) THEORETICAL FRAMEWORK

In arid and semi-arid parts of sub-Saharan Africa, pastoralism is a well-suited way of life. In Ethiopia pastoral area cover more than 62% of the national land area ??EARO, 2003), which support about 9.8 million people of which 56% are pastoral, 32% are agropastoral and remaining 22% are urban dwellers ??EEA, 2005). It contribute about 30% of the GDP and 90% of the hard currency from live animal export and employs about 27% of the national population (Amaha, 2003). However, this communities are marginalized and generally not given due consideration in wider sociopolitical analysis (Simenew et al., 2013) of the country relative to Highland area.

Camels live in the vast pastoral areas in Africa and Asia, Ethiopia stands third in camel population in Africa 46 by possesses over 2.4 million dromedary camels (FAO, 2010), which is all owned by pastoral. In this harsh area, 47 camels produce milk even during the dry season when milk from cattle is scarce ??Bekeleet al., 2002), because of 48 this outstanding performance pastoralists of eastern Ethiopia mainly rely on camels for their livelihood, without 49 camel their life can be jeopardized. However, despite its significant contribution camel is one of the neglected 50 domestic livestock by the scientific community in Ethiopia ??Yesihak and Bekele, 2003), until recently. Even 51 regarding camel milk, very little is known and understood about its marketing, despite its critical and increasingly 52 relevant role for the pastoral/agro-pastoral food security (Nori, 2010). 53

Ethiopia produces about 75,000 tons of camel milk (Felleke, 2003). However, pastoralists have not economically 54 55 benefitted to the extent they ought to from the milk produced (Bedilu et al., 2015) because their participation 56 in market-led dairy development has not been widespread. Hence, increasing pastoral market participation as 57 well as developing chain competitiveness and efficiency are valuable strategies for poverty alleviation and food 58 security in arid and semi- One of the necessary condition for producers to reap economic benefits is the provision of assured milk market outlets (Bardhan et al., 2012). However, scant attention has been given on analyzing the 59 factors that determine dairy producers' channel choice (Berhanu et al., 2013), especially there have been relatively 60 few studies to quantitatively asses milk market outlet issue (Falkowski et al., 2008), even though market access 61 is one of the major limitations in harnessing opportunities in camel milk production, as camels live most of the 62 time in remote area their milk accessibility could be difficult. The major camel milk marketing channels 1 II. 63 Material and Methods through which pastoral and agro-pastoral of eastern Ethiopia can deliver their camel milk 64 are consumer channel, assembler channel, retailer channel and commission agent channel. 65

To maximize the benefits that pastoral and agro-pastoral earn, they have to make an appropriate decision as to where and to whom they should sell their camel milk produce. Identifying these factors is very important regarding determining areas of interventions for effective policy formulations and to integrate pastoral and agropastoral into the modern marketing channels. Consequently, the research is aimed at providing an empirical basis for identifying camel milk market channel choices of pastoral/agro-pastoral. In doing so, the study attempts to contribute to filling the knowledge gap by assessing factors affecting camel milk market outlet choices in eastern Ethiopia.

⁷³ 2 a) Topography and climate of the study region

The study was conducted in the arid and semiarid area extending from Gursum to Babile districts of Hararghe
zone, Oromia Regional State of Ethiopia, along the main road to Jijjiga having an area of 967.3 km 2 and 3022.2
km 2, respectively. The camel milk-shade extends from Dire Dawa to Harar to Jijjiga milk-shade, it is not only
limited to Gursum and Babile districts.

78 Gursume and Babile districts are characterized by warm lowlands between 1200 m to 2950 m and 950 1 Camel 79 milk marketing channel is a sequence of milk marketing institutions from milk producers to final consumers, 80 including pastoral/agro-pastoral milk producers, milk traders (such as assemblers, retailers, wholesalers etc.), brokers, commission agents and the final users of camel milk, who exist for their joint opportunity in the camel 81 milk market. to 2000 m above sea level, respectively. The area has a good potential for camel and camel milk 82 production, which is mainly commenced by pastoral and agropastoralists households of both Oromia and Ethio-83 Somali tribe. The districts livestock population comprises of 125, 996 cattle, 23160 sheep and 10936 camel (East 84 Hararghe profile, 2009). 85

⁸⁶ 3 b) Source of data and sampling techniques

The field was conducted during 2012/13 year. Data collection focused on household heads, key informants, 87 rapid market appraisal and focus group discussions. In addition to the primary data, different sources were used 88 to collect secondary data. The selected districts and Peasant Associations (PAs) were selected as they were 89 considered the milk-shade due to their potential for camel milk production and commercialization. Two-stage 90 stratified sampling was employed to select the sample households (HHs). The base for stratification of sample 91 household was milk production types as only camel, and both camel and cow milk producers as pastoralists and 92 agro pastorals own only camel or else both camel and cow as their livestock herd. Based on the stratification, 53 93 and 40 households were selected from only camel, and camel and cow milk producers, respectively. Then using 94 probability to proportional sample size sampling technique making the sample HH level 93 households. 95

⁹⁶ 4 c) Theoretical Framework

97 The study is based on the theory of rational choice, which is used in modeling economic behavior. The theory 98 assumes that pastoralists and agropastoralists are rational, means they will rank alternative marketing channel outlets in order of utility subject to pastoralists socio-economic, demographic and institutional factors influencing the choice entrenched in each outlet. Hence, pastoralists'/agro-pastoralists' milk marketing channel outlets choice was conceptualized using the random utility model.

The pastoral and agro-pastoral of eastern Ethiopia were mapped into four marketing channel outlets: direct consumers, assembler, retailer and commission agents. The camel milk producer pastoral/ agro-pastoral i was able to choose from a set of alternative channels (j=1,2,3,4) (which provided a certain utility level ?? ???? from each alternative, by comparison on marginal benefit and costs based on the utility that will be gained by selling to particular camel milk marketing channel.

However, according to Green (2002), it is not possible to directly observe the utilities, but the choice made by pastoral/agro-pastoral revealed which marketing outlet provides the great utility. Hence, the utility was decomposed into deterministic ?? ???? and random ? ???? part:?? ???? = ?? ???? + ? ????(1)

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Since it was not possible to observe the random (? ????) and predict exactly the choice of camel milk marketing channel, the probability of any particular channel choice was used in which a pastoral/agropastoral selected a marketing outlet j=1 if:ij ij U U > k i ? ? (2)

Where ?? ???? represents a random utility associated with the market channel outlet j=k, ?? ???? represents an index function denoted the decision maker's average utility associated with this alternative and ? ???? represents the random error.

¹²¹ 7 d) Methods of data analysis

Both descriptive and econometric tools were used to analyze the collected data. Descriptive statistical tools were used to explain the socio-economic, demographic and institutional characteristics of camel milk market participants. While Multinomial Logistic Model (MNL) was used to identify the determinants of camel milk market channel choice decisions (Berhanu et al., 2013;Xaba and Masuku, 2013;Mukiama et al., 2014; ??ezabih et al., 2015;Riziki et al., 2015) of the sampled pastoralists and agro-pastoralists, because it is the standard method for estimating unordered, multicategory dependent variables. It also assumes independence across the channel choices, that is, it does not allow correlation between alternatives (Wooldridge, 2006).

The result revealed that households accessed milk market channel outlets such as individual consumers, 129 assembler, retailer, commission agents and the combination of thereof. However, due to mutually inclusiveness 130 of choices, fewer representation and similar collection and operation practices, only household who had access 131 to individual consumer, assembler, retailer and commission agents camel milk market channels were considered 132 in multinomial logit regression. Out of these channel choices, selling camel milk to assembler was taken as a 133 base category against which other milk market channels are going to be compared. Following ??reen (2003), the 134 Multinomial Logit model for multiple choice problems takes the form:or j y i j i j i o i j x x x x ? ? ? ? ? ? ? ? ?? 135 + + + = = ...) Pr(?? = ? + ? = = = = 1 1 1 1 1 1) (Pr J j x x k k k jk k k k jk j y ob ???? (3) 136

137 Given Prob (y = 1), where j = 1, 2, 3, J - 1.

The parameter ? has two subscripts in the model, k for distinguishing x variables, and j for distinguishing response categories. The subscript j indicates that there are J-1 for sets of ? estimates. In other words, the total number of parameter estimates is (J-1)k. This implies that the sample size should be larger than (J-1)k.

To test the potential multicollinearity problem among discrete and continuous variable (Green (2002), variance inflation factor (VIF) and contingency coefficient (CC) among explanatory variables were tested, respectively. And it was found not to have any potential influence on estimates from the model. The econometric software STATA 13 is used to estimate the parameter coefficient and predicted marginal value.

¹⁴⁵ 8 e) Variable Hypothesis i. Dependent Variable

Camel milk market channels or outlets are those pathways where camel milk produce passes through to reach the final consumer. According to the consumer theory, camel milk producers are expected to choose the best channel through which they sell their camel milk depending up on various criteria. The prevailing alternative camel milk marketing channels for the sampled households include Direct to Consumer, Assembler, Retailer and Commission agent. Of which the base category is Assembler Channels only because this channel was chosen by most of the pastoral/agropastoral households to trade their camel milk.

Consequently, the dependent variable for the model is discrete variable taking a value of 1, 2, 3, and 4 representing the channel choices, where 1 represents selling camel milk through consumer channel; 2 represents selling camel milk through assembler channel; 3 representing selling camel milk though retailer channel; and 4 represents selling camel milk through commission agent channel.

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¹⁵⁷ 9 III. Results and Discussion

Camel milk is the vital part of a diet for pastoralist of eastern Ethiopia, especially during the drought period 158 when pasture is scant, and it produces milk when milk from cattle is scarce (Bekele et al., 2002). In the study 159 area camel milk is consumed mostly as a raw state, milk tea, and in the form of fermented milk without adding 160 any value to the camel milk, because of the limited ability of camel milk to be coagulated by enzymes, due to 161 the composition of the case micelles (Zubeir and Jabreel, 2008). However, a small amount of milk produced 162 in the study area is subject to butter and cheese processing by mixing it with goat and cow milk based on their 163 endogenous knowledge, the result is in agreement with the finding of Yagil (1982). Nevertheless, it is possible to 164 processes camel milk into cheese using Camifloc and calcium chloride (Khan et al., 2004; ??ubeir and Jabreel, 165 2008) to preserve camel milk and create potential trade to camel keepers in semi-arid and arid areas of Eastern 166 Ethiopia, as it can help to improve pastoral/agro-pastoral economic condition by finding a proper market for 167 camel milk cheese, especially by exporting to Europe (Saima et al., 2003). 168

¹⁶⁹ 10 a) Composition and physical characteristics of camel milk

Dromedary camel milk composition is excellent in from nutritional view point (Sisay and Awoke, 2015) as it has valuable nutritional properties as it contains a high nutritional value, with vitamin C, which is three times greater than the cow's milk, iron content ten times and B vitamins present in reasonable amount (Arrowal et al.,2005). In addition to that, cow milk tends to make people fat, causing obesity but camel milk gives strength, endurance, and stamina, and attribute that pastoralists need in order to pursue a nomadic life style (Sisay et al., 2015). However, the camel milk has not been given as much attentions in research and development as the cow milk, especially in Eastern Africa.

177 11 b) Camel milk market participation by sample pastoralist 178 and agro-pastoralists

The average milk yield per day per camel was estimated to be 4.8 liters under the desert condition for the study area. The study spotlighted that, the total camel milk produced per day in the study area was estimated to be 1720.25 liters or 12041.75 liters of milk per month, and the average milk yield per lactation per head was found to be 1391.23 liters. The study reveals that all of the camel dairy owned by sampled respondents were found to be local breeds, which are low in milk productivity as compared to Israel's' dairy camels which yield 20 liters a day or more (Yagil et al., 1994).

Out of the total sampled household, 98.9% of sampled camel milk producers were found to participate in milk marketing. The share of camel milk sold by sample producer was 77.76%, and the mean milk production per day per dairy household during the survey period was found to be 18.48 liter, by revealing that the study area has high potential of commercialization if due attention is given regarding market-oriented milk production and liking farmers with modern market which is based on consumer needs to increase the competitiveness of camel milk in the study area specifically and in sub-Saharan African generally.

¹⁹¹ 12 c) Market characteristics in relation to market outlets

The study reveals that most of the sampled households (35.87%) sell camel milk though the assembler channel 192 outlet. Next, to the assembler, 29.35% of the sampled households sell their camel milk produce through direct 193 consumer channel. The remaining pastoralists and agro-pastoralists sell their camel milk though retailer (18.49%) 194 195 and commission agent (16.3%) marketing channel. In Easter Ethiopia, camel milk producers supply milk as a household and by forming informal groups of women locally called 'affosha 2 2 'Affosha' is informal group of 196 women who group themselves up to ten persons together to market camel milk by round up to same amount as 197 they were agreed, especially pastoral/agro-pastoral who produce small amount of came milk use such informal 198 grouping mechanism to reduce the transaction cost associated with selling small amount of milk at distance milk 199 market. 200

201 ' and the other social institution in the camel milk marketing is personalized method of economic exchange 202 called 'maamilla' which is based on a supplier and buyer trust-based relationship that Nearly all of the camel 203 milk trader's (especially, rural assembler and retailer) in the study area were females, this result is consistence to 204 Nori (2012) who revealed that camel milk is predominantly marketed by women in Puntland, Somali, implying 205 that increasing the competitiveness of the camel milk though value addition in Eastern Africa would have high 206 importance at enhancing female milk traders empowerment, food security and poverty alleviation in arid and 207 semi-arid parts of sub-Saharan Africa.

The mean household characteristics by camel milk market outlets are provided in Table 2. The mean age of market participant pastoralist and agropastoralist who used the consumer, assembler, commission agent and retailer market as marketing outlet had 41 years, 43 years, 46 years and 46 years, respectively. This implied that those respondents who sold their camel milk to the consumer were slightly younger than those who sold at the other channels. This reveal that younger people tend to market their produce at distance urban markets to reap the full benefit of price margin which goes to milk marketing middleman, even by taking the risk and transaction cost associated with trading milk in the urban market as selling camel milk via profitable channels can lead to investment in productive assets and new agricultural technology (Jensen, 2010).

Households with few numbers of children below five years old marketed their camel milk though consumer milk 216 marketing outlet, other than assembler, commission agent and retailer because as the number of children below 217 five years old reduce the time allotted to market milk at distance urban markets would be better off. The mean 218 dairy farming experience was highest for pastoralist and agro-pastoralist who had access to assembler, retailer 219 and commission agent milk market channel outlet, with 43 years, 46 years and 46 years, respectively. The main 220 reason for this is that, most of the experienced camel milk producers had informal business tie with the milk 221 purchaser locally called 'maamilla' which mean customer. Most of the time experienced dairy producers do not 222 sell camel milk unless the buyer is their customer, as this experienced dairy producers also market their camel 223 milk in return to sugar and salt with their 'maamilla', and even at credit base. 224

The average distance traveled to the nearest urban milk market was lowest to households who had access to 225 direct consumer channel outlet (13 km), compared to pastorals/agro-pastorals supplying to retailers outlet (20 226 km) and commission agent outlet ??26 km). This reveals that most of the time commission agent collect camel 227 milk from pastorals and agropastoralist who residence is far from town as wholesalers own track to collect and 228 transport the camel milk to Somali land. Moreover, the research pinpointed that, the average price offered by 229 commission agent market outlet was 5.59 Ethiopia Birr per liter, which is higher than the price offered by other 230 market outlets as commission agent purchase camel milk in large quantity and good quality, which would be 231 232 exported to Somali land.

²³³ 13 Source: Field data analysis, 2012/2013

The mean dairy camel ownership of households who had access to consumer, assembler, commission agent and 234 retailer milk market outlets was 6, 15, 13 and 8 numbers, respectively. This reveals that households that owned 235 a large number of dairy camels accessed assembler and commission agent milk market outlet because of the 236 two-channel purchases a large amount of camel milk, especially the commission one because the camel milk 237 purchased by commission agent is supplied to wholesalers who export camel milk to Somali land. The same holds 238 for the quantity of camel milk sold, as we can observe that the largest amount of camel milk quantity was sold at 239 commission agent milk market and assembler milk market channel with the mean value of 24 liters and 21 liters, 240 241 respectively. The lowest quantity of camel milk was supplied to consumer milk market channel outlet with the mean value of 6 liters. 242

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Households with high income tend to sell their camel milk to assembler and the consumer channel outlet, with the mean value of 6494 and 6038 Ethiopia Birr, respectively. Households with lower income from nondairy source choice to sell their milk at the commission agent and retailer marketing channel outlet with the mean value of 1384 and 2822 Ethiopian Birr, respectively. The mean family size by camel milk market outlets was 7, 8, 8, and 7 with individual consumer, assembler, commission agent and retailer, respectively. The mean household size for households who accessed consumer and retailer milk market outlet was higher than the mean household size reported by Berhabu et al., ??2013) for Woliata zone cow milk-shed.

The proportion of household characteristics by camel milk market outlets is given in Table 3. In term of 251 education level, the result indicates that out of the educated respondents the market participants who used the 252 consumer, assembler, commission agent and retailer channel outlet were 51.85%, 22.22%, 7.41% and 18.52%, 253 respectively. It is evident that camel milk participants who sold their milk at consumer outlet had a higher 254 percentage than others channel outlet, this was because of the fact that education enhanced milk market 255 participant ability to perceive the high level of returns from urban milk market. Hence, there is a need to 256 improve the dairy farming pastoralists educational level to enable them to make an informed decision on camel 257 milk marketing channel outlet they choice. Out of the households who had access to livestock service 37.5%, 258 21.88%, 9.38% and 31.25% of households had accessed individual consumer, assembler, commission agent and 259 retailer camel milk market outlets, respectively. In terms of milk market information, the result reveals that out 260 of the sampled respondents who have milk market information 36.62%, 30.99%, 15.49% and 16.9% sold their milk 261 at consumer, assembler, commission agent and retailer market outlet, while out of sampled respondents who had 262 no market information only 4.76% sold their milk at consumer channel outlet. This reveals that the majority of 263 market participants who sold at urban market directly to consumers had access to price information. 264

²⁶⁵ 15 d) Determinants of Camel milk market channel choice

Out of eleven variables hypothesized to influence camel milk market channel choice, six variables were found to be significant. Table 4 presents the Multinomial logit estimates for the hypothesized variables.

Education status of the household head was positively related to a household choice of consumer channel outlet over assembler dairy marketing channel, at 5% significance level. This reveals that education increased the household likelihood of selling its camel milk through the consumer outlet over the assembler by 29.5 percent. This result is in agreement with the finding of Mamo and Degnet (2012), who revealed that educated farmers

272 preferred selling to an actor that offered better prices.

Having access to livestock extension services is significantly associated with high probability of selling camel 273 milk to the retailer channel as opposed to assembler channel. The possible explanation could be retailer supply 274 camel milk to hotels, restaurants, and urban consumers with good quality. Only pastoralist and agro-pastoralist 275 who had training on camel milk handling through extension services were able to sell their camel milk through 276 retail channel over assembler channel. The marginal effect shows that the likelihood of accessing retailer milk 277 278 market outlet increases by 35.5% as compared with assembler milk market outlet for one more member access to livestock extension services. Contrary to the expectation, distance to market positively influenced the likelihood 279 that sampled pastoral and agro-pastoral will choose commission agent and retailer over the base channel outlet 280 (assembler) at 0.7% and 1.5%, respectively. A plausible explanation for this is that household who were far from 281 market places preferred to sell their camel milk to commission agents because commission agents collect milk 282 from distance place. The results are consistent with findings by Moturi et al., (2015). 283

There was a positive relationship between choice of direct consumer market channel and access to market information. The result of the study reveals that access to market information increased the household likelihood of selling its camel milk through the direct consumer outlet over assembler by 29.6 percent, it is significance at p-value of 1 percent. The finding is in line with that of Geoffrey (2015), who revealed that increase in price information had a positive influence on the choice of selling pineapple the local market channel.

Income from nondairy source is significantly associated with a high probability of choosing direct consumer and commission agent market as compared to selling to assembler channel. The probability of choosing direct consumer and commission agent milk market channel as opposed to selling to assembler channel increases for every unit increase in the household nondairy income by 0.003% for both consumer and commission agent channel over the assembler channel outlet, it was highly significant at 1% level for both channels.

²⁹⁴ 16 IV. Policy Implication

Using household data from Ethiopia, we have examined pastoral and agro-pastoral milk market channel choice to sell their camel milk, and based on the study result the following policy implications were forwarded for future intervention to improve the camel milk market in Eastern Ethiopia.

In the study area camel milk marketing lack inadequate horizontal and vertical integration among pastoralists 298 and agro-pastoralists milk producers, milk assemblers, retailers, and commission agent. Sampled pastoral and 299 agro-pastoral households supplied their milk through traditional marketing channels such as assembler channel 300 (35.87%), direct consumer channel (29.35%), retailer channel (18.49%) and commission agent channel (16.3%), 301 even though pastoral and agropastoral have social capital which is based on informal collective action institutions. 302 However, though exploiting the indigenous knowledge of eastern Ethiopia pastoralists and agro-pastoralists such 303 as "affosha", (informal types of group which supply camel milk to one another by grouping themselves up to 10 304 persons) and "maamilla" (customer based camel milk selling) it would be easy to cording and form horizontal and 305 vertical integration among the pastoralists to enhance institutional arrangement which is based on endogenous 306 knowledge of the pastoralist society. As organizing such informal institution into formal one such as cooperative 307 and modern marketing channel have a great advantage to attaining competitive edge by forming a strategic 308 alliance in the camel milk marketing channel. 309

As most of the milk trader who operates in all milk market outlets are females, improving milk trading practice through vertical and horizontal linkage based on endogenous knowledge would empower the female milk trader and enhance their capacity, especially the value addition one. Therefore there is a need to develop gender smart intervention approach to consider gender as a core process in the camel milk value chain, as such intervention brigs gender gap in the arid and semi-arid area of eastern Ethiopia.

Despite the lack of coordinated marking channel in the study area, the assemblers channel has remained the most prevalent marketing channel for the sampled pastoral and agro-pastoral households. Hence, it would be important to enhance the existing tradition marketing channel into better existing profitable market channel, i.e. in our case to the direct consumer channel and commission agent channel to empower the pastoralist and agro-pastoralist camel milk producers and to reduce poverty.

The Multinomial logit model result reveals that compared to accessing assembler milk market channel outlet, 320 the likelihood of accessing direct consumer market outlet was higher among educated households, as educated 321 farmers preferred to sell to an actor that offer a better price. The likelihood of accessing retailer market channel 322 outlet was higher for households who had access to livestock extension serves over the assembler channel outlet. 323 The possible explanation could be as retailer supply camel milk to hotels, restaurants and urban consumers at 324 good quality, respondents who gone training on camel milk handling though training services were able to sell 325 their camel milk. Compared to accessing the assemblers milk market channel outlet the likelihood the respondents 326 choose commission agent and retailer outlet increases by 0.7% and 1.5%, respectively. A plausible explanation 327 is that, household who were far from market place had not alternatives rather than selling to commission agent. 328 The other factors which affected, milk market channel choice by sampled respondents were income from nondairy 329 source and market information. The result of the study reveal that, access to market information increased the 330 household likelihood of selling its camel milk through the direct consumer outlet over assembler by 29.6 percent. 331 Therefore, as one of the key factor to boost camel milk market outlet choice, dairy extension services, camel milk 332 collection center at distance place, information dissemination through formal source should be strengthened. 333

1

The expected effects of each of these variables are summarized as follows in Table 1. The following variables were used as an independent variable: Age of the household head (AG_HH), Educational level of household head (EDL_HH), Household members under 5 years (HH_MM5_YR), Experience in livestock Production (EXP_LIV_PRO), Livestock extension service (LV_ESV), Distance to near dairy milk market (DS_MLK_MRK), Number of milk camel own

[Note: (N_MIK_CAM), Milk market information (MRK_IFF), Quantity of milk sold (Q_MIK_SOLD), Income from nondairy source (IN_NOND) and Family size (FS_HH).]

Figure 1: Table 1 :

$\mathbf{2}$

Variables	Consumer Mean	Assembler Mean	Commission A gent Mean	Retailer Mean
Age	41(9.7)	43 (11)	46 (13.7)	46 (16.6)
Children's (<5 years)	1(1.2)	2(1.8)	2(1.3)	2 (1)
Experience	18(13.4)	21(15)	24(15)	25(17)
Distance	13(6.8)	13(11)	26(18)	20(10)
Number of milk camel	6(1.14)	15(2.4)	13 (2.7)	8 (1.8)
Quantity of milk sold	10(9.6)	21 (15)	24(21)	12(12.7)
Income from non-dairy	6038(6369.3)	$6494 \ (12057)$	1384 (2448.8)	2822 (3380)
Family size	7(3.3)	8(5)	8(4.5)	7(3)
Selling price/liter	5.38(0.15)	4.88(0.15)	5.59(0.19)	4.93(0.2)

Figure 2: Table 2 :

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Variables		Consumer Percent-	Assembler Percentage	Commission Percentage	Agent	Retailer Percentage
Education status of HH	Uneduca Edu-	age t 2d 51.85	41.54 22.22	20 7.41		18.46 18.52
Access to livestock Extension	cated Yes No	37.5 25	21.88 43.33	9.38 20		31.25 11.67
Access to milk mar- ket information	Yes No	$36.62 \\ 4.76$	30.99 52.38	15.49 19.05		16.9 23.81

Source: Field data analysis, 2012/2013

Figure 3: Table 3 :

 $\mathbf{4}$

Explanatory Variable AG_HH EDL_HH	Direct to 0 0.015 1.774**	Consumer Coef. dy/dx 0.002 0.295**	Commiss 0.022 0.014	ion Agent Coef. dy/dx .0009 -0.053	Coef. 0.038 0.575
HH_MM5_YR	-0.542	-0.072	-0.117	0.006	-0.248
EXP_LIV_PRO	-0.009	-0.0005	0.011	-0.0006	0.014
LV_ESV DS_MLK_MRK N_MLK_CAM MRK_IFF	1.893** 0.006 -0.138* 3.092***	0.138 -0.005 -0.015 0.296***	0.523 0.096*** -0.975 0.413	-0.057 0.007* -0.004 -0.006	2.562* 0.1** -0.105 0.244
Q_MIK_SOLD	-0.028	-0.004	0.049	0.006	0.024
N_NOND	0.0013*	0.00003***	-0.003*	0.00003***	-0.000
FS_HH _cons	-0.708 -2.343	-0.016 Number of obs.=92 LR chi2(33)=81.80 Prob> chi2=0.0000 Pseudo R2=0.333 Log likelihood= -81.945	0.12 -3.463	0.012	0.06 -3.305

Source: field data analysis, 201

Figure 4: Table 4 :

Acknowledgements .1 334

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