

ASSESSMENT ON THE PRODUCTION SYSTEM, CONSTRAINTS, OPPORTUNITIES OF SMALLHOLDER CATTLE FATTENING PRACTICES IN JABITEHNAN DISTRICT, AMHARA REGION, ETHIOPIA

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SUMMARY

The study was carried out to characterize the beef cattle production system, to identify the major constraints and opportunities for smallholder cattle fattening practices the current smallholder cattle fattening practices. The study was conducted using questionnaire-based survey by interviewing a total of 120 households heads participates in cattle fattening practices selected by a systematic random sampling method from seven rural kebeles including one kebele from Finoteselam town in weina-dega (Mid-altitude) and two kebeles in sub-kola (low land) agro-ecologies of Jabitehnan district in Amhara National Regional State, Ethiopia. Moreover, focus group discussions, field observations techniques have been carried out. Descriptive statistics, one way ANOVA and DMRT for comparison of means were carried out using SPSS version 16 soft ware and Chi-square (χ^2) test was employed to test the association of different qualitative categorical variables. The basal feeds were fresh cut green forage including improved forage and weeds took higher proportion (63.3%), followed by maize stover and stubble grazing (22.4%), pasture grazing (9.7%), and hay (5%). The three types of houses for fattening cattle are separated room in the family house (62%), enclosed barn with simple shade (22.4%) and housed together with humans (15.6%). Sources of fattening cattle were culled oxen due to old age or being unproductive (34.6%), immediate purchase for fattening (55.7%) and both culled oxen and immediate purchase (9.7%). Feed shortage, lack of enough capital and credit, lack of family labor during seasons of peak agricultural activities lack of extension service and capacity building were the major constraints of smallholder cattle fattening in decreasing order of importance. Chi-square (χ^2) correspondence analysis showed that the availability of feed shortage, lack of extension service, and capacity were not significantly ($P>0.05$) different between the two agro-ecologies. However, lack of family labor during seasons of peak agricultural activities significantly affect ($P<0.05$) cattle fattening practices in the sub-kola than in the weina-dega and lack of capital and credit significantly affect ($P<0.05$) the practice in the weina-dega than in the sub-kola. Average price of cattle before and after fattening were about 2297 and 3670 birr, respectively, which resulted in gross profit of about 1359 birr per fattened cattle that came from price margin and feed margin over 97 days of feeding period.

Key words : Agro-ecology, cattle fattening, feed resources and constraints

The livestock population of Ethiopia is believed to be one of the largest in the world and the largest in Africa totaling up to 134.33 million animals (NABC, 2010). In livestock sub sector livestock contributes about 12% and 33% of the total agricultural Gross Domestic Product (GDP), respectively, and provides livelihood for 65% of the population (Ayele *et al.*, 2003). Crop and livestock sub systems interacts each other in many ways in the Ethiopian. Highlands are characterized by crop-livestock mixed farming systems. This part covers around 40% of the total land surface. It is featured by a mixed farming system where

crop cultivation and livestock production are undertaken side-by-side complementing each other. Livestock is primarily kept on smallholdings where it provides draught power for crop production, manure for soil fertility and fuel, and serves as a source of family diet and source of cash income (from the sale of livestock and livestock products) particularly when markets for crops are not favorable (*ibid*). There are, however, key constraints to the productivity of livestock in Ethiopia Feed shortage, livestock diseases, lack of extension service, lack of enough credit, inadequate market places, lack of adequate supply of

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good condition animals, lack of holding (concentration) places, shortage of stock supply for fattening/reproduction, lack of market information and low price due to poor body conditions (Berhanu *et al.*, 2007). The area of land allocated to grazing in the highlands progressively declined through time due to the expansion of cultivation (Alemayehu, 2002; Zerihun, 2002). As a result of this, scarcity of feed resources is the major bottleneck to livestock production in the highlands of Ethiopia, where natural pasture and crop residues are the major sources of feed supply to livestock (Zerihun, 2002). However, these feed resources are inadequate quantitatively and qualitatively to support reasonable livestock production (Mohamed-Saleem and Abate, 1995). In Ethiopia, there are three types of cattle fattening systems namely; traditional, by-product based and the Hararghe type of fattening which varies mainly depending on the available feed resources, source of fattening cattle and marketing conditions (Arend Jan Nell, 2006). After plowing, when the plowed oxen become older or emaciated and suspected that the oxen will not be able to plow for the next season, farmers decide to fatten their oxen and supply for the market to replace young and healthy plowing oxen for cultivation. Moreover, some rural farmers and semi-urban dwellers have experienced fattening by purchasing emaciated oxen, steers and cows from the surrounding market and sell them after some months of feeding period to get profit. For example, in 2011 alone, 3791 cattle were fattened in Jabitehnan district (JDOA, 2011).

Statement of the Problem

Even though smallholder cattle fattening practices have been practiced for many years, constraints and opportunities are not still identified and characterized in the study area. Even if detail-constraints and opportunities have not yet been compiled out, the district seems suitable for cattle fattening due to suitable market access and presence of two all-weather roads connecting with Bahir-Dar and Addis Ababa. Apparently the district is known in cereal crop production and the resulting crop-residues could be used as potential feed source, there may be still mishandling and lack of feed resources. Besides, there may be lack of proper selection of fattening cattle, lack of working capital and credit, lack of market information and poor managements in relation to feeding system, healthcare, housing, etc.; which may lower the performance of cattle fattening. Hence, the

producers may not get reasonable benefit from their fattening activities unless appropriate improvement strategies are introduced.

Objectives of the Study

General objective

To generate baseline information, that can be used for future interventions to develop market-oriented cattle fattening program within the integrated mixed crop-livestock system.

Specific Objectives

- To characterize the beef cattle production system
- To identify the major constraints and opportunities for smallholder cattle fattening practices.

Description of the Study Area

The study was conducted in Jabitehnan district, which is found in West Gojjam Administration Zone, Amhara National Regional State. Jabitehnan district is situated at about 387 km North-West of Addis Ababa at the main highway through Debre Markos leading to Bahir Dar and about 176 km from Bahir Dar town.

Sample Size and Sample Selection Procedure

A multistage sampling procedure was

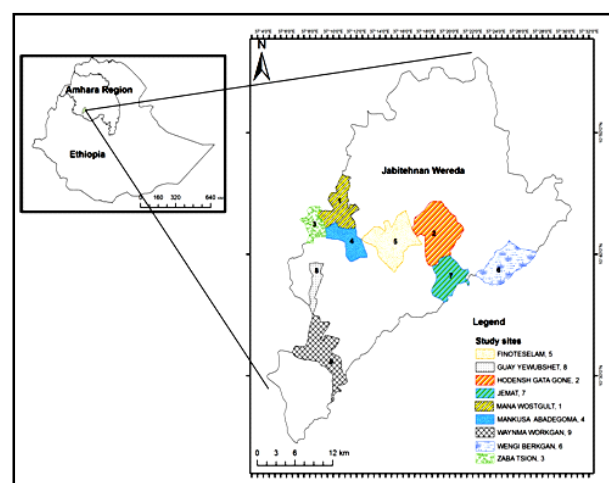


Fig. 1. Map of Jabitehnan District and Sample sites (Source: Produced on ARC Map software from Amhara Region shape file).

employed to select representative kebeles and households. Kebeles (group of villages) were purposively selected from each of the two agro-ecologies based on the population of beef cattle in each kebele (group of villages). Accordingly, kebeles that have relatively higher beef cattle population in the production system were considered for the study. In addition to the selected eight kebeles (group of villages) from the district, Finoteselam town, which is the capital of the district, was also considered as the ninth sample site for the study. A systematic random sampling method was employed to select 106 households from the selected rural eight kebeles in the district. Whereas, 14 households were selected from the selected kebele found in Finoteselam town. Systematic random sampling is a type of probability sampling technique with the systematic random sample, there is an equal chance (probability) of selecting each unit from within the population when creating the sample. A total sample size of 120 households was selected from the study area. Out of which 93 households were selected from 7 kebeles in the *weina-dega* and 27 households were selected from 2 kebeles in the *sub-kolla* based on beef cattle population.

Data Collection Techniques

Two sources of information were considered to collect the required data. Both secondary and primary data sources were used. Primary data sources are the household heads, Traders and Butchers in the district. The secondary data sources were taken from the district agricultural offices, zonal office of agriculture and NGO's of the district and documents that have been written about the study area. PRA techniques such as individual and group discussion with key-informants were held to collect wide range of qualitative data. In each of the study kebeles, discussions were made with agricultural development agents and five to eight selected households considering their age and experience with cattle fattening activity to know the production system, the major constraints, opportunities and marketing system for cattle fattening in the area.

Focused formal survey was conducted using semi structured and pretested questionnaire to quantify some of the important parameters (herd size, length of feeding period, price of cattle before and after fattening, number of fattening cattle per household) for the study. The specific procedure used for data collection depends on the type of data that was sought

and the sources of information. The study was composed of three main components as production system, constraints and opportunities of smallholder cattle fattening of the practices. Accordingly, the procedures of data collection pertinent to the three component studies were discussed separately.

Collection of data

Primarily, over view of the area was perceived through discussion held with agricultural extension officers, experts and development agents. Group discussion with key informants was also employed to know the overview of smallholder cattle fattening practices in the area. A questionnaire-based survey was used to collect data needed for assessment of the production system, constraints and opportunities of the fattening practices in the area. Before starting data collection, the questionnaire was translated into Amharic and pre-tested using purposively selected key informants, such as elderly persons and farmers with long time of experience in cattle fattening practices. Accordingly, many of the questions in the questionnaire were restructured or rephrased for the purpose of clarity.

Questionnaire

based data collection for assessment of the production system, constraints and opportunities of the fattening practices included the following variables, socio-demographic characteristics (age, sex, marital status, family size, educational background, primary occupation, income sources, landholdings), cattle herd structure, experience and purpose of cattle rearing, feeds and feeding system, cattle health and disease problems, extension services, cultural and religious constraints, institutional capacity and marketing systems. While interviewing, the researcher was assisted by development agents (diploma holders), who had been trained in interviewing techniques before data collection. In addition, data collection was performed under close supervision of the researcher. Accordingly, data collectors were visited and monitored regularly while conducting the survey as well as each questionnaire was promptly checked up on submission to verify biased and ambiguous information and when necessary, concerned enumerators were promptly contacted for explanation while they have fresh memory about the issues. In addition to the formal survey, group discussions were held with key informants in each agro-ecology with

the help of topical guidelines (checklists) for some qualitative constraints, opportunities and marketing parameters. This provided additional information to the production system, constraints and opportunities of smallholder fattening practices and marketing system in the study area.

Data Analysis

Statistical analysis of the primary data was made using the statistical package for Social Science (SPSS, 2010) version 16. Survey results were reported using descriptive statistics. Chi-square (χ^2) test was employed to test the association of different qualitative categorical variables included in this study. One way ANOVA and Mean comparisons for some of the variables such as landholdings, livestock holdings and prices were declared using Duncan's multiple range test (DMRT). Data related with pricing, collected for the characterization of cattle marketing system were analyzed using descriptive statistics and data collected using RMA technique were reported with flow charts and summarized discussions.

RESULTS AND DISCUSSION

Family Size and Educational Level of the Household

Responses of the household survey showed that the average family size of the households to be 5.91 ± 0.16 which is slightly higher than the Amhara regional average 5 persons per household (Girma et al, 2003) and 5.2 persons per household of the national average (CSA, 2003) and almost similar to 6.22 persons per household (Adebabay, 2009) in Burie District. Out of this, males accounted for 52.4 % and females accounted for 47.6 %, which is similar to the finding of (Shitahun, 2009) that is 53.84 % and 46.16 % for males and females, respectively.

Out of the total family size indicated above 47.8 % of the family was under the age of 15-55 years, 34.7 % was under the age of <15 years and 17.5% was under the age of >55 years as shown in Appendix table 2. The higher percentage of the age structure between 15-55 years as compared to <15 and >55 years has a positive implication in the availability of labor for the fattening practices carried out by smallholders. It is obvious that education is a base for any development. Results of this study shows that 28.3% of the sampled household heads are illiterate, 39.4 % can only read and write, 25.6 % of them were enrolled

in primary and junior schools, 5.1 % attended secondary school and 1.6 % attended preparatory. The results of the current study shows that participants attended literacy and over (71.7%) were more involved in cattle fattening than those who cannot read and write (28.3%). This may be due to participants that are on literacy and over may be more aware of the benefits of the fattening practices than who cannot read and write. The higher percentage of literacy and over may be one opportunity for participants to adopt knowledge about the fattening practice delivered through training and extension service.

Livestock Holding and their Utility

Average holdings of total livestock and cattle per household in this study were 6.73 and 4.82 in number, respectively (Table 1). However, the livestock holding per household in this study was slightly lower than 7.24 and average holdings of cattle per household was higher than 4.16 per household that was reported by (Fisseha, 2009) in Burie district and higher than 3 per household in Amhara region (Aklilu, 2004).

Name of Kebele : *Zaba Hodansh Mana Menkusa Jimat Wongie Bakel Abater Average Weynma Guay* Average holdings of total livestock and cattle per household in the two study agro-ecologies was similar ($P > 0.05$) than in *weina-dega* (Table 1). However, within the *weina-dega* kebeles, Hodansh kebele had higher ($P < 0.05$) total livestock holding and cattle per household than Menkusa-Abdegoma and Bakel-Abater kebeles and within the *Sub-kola* kebeles, Woyntma kebele had higher ($P < 0.05$) livestock holding and cattle per household than Guay-Yewbshet kebele. This may be due to more total and cultivated land holdings per household from which higher proportion of livestock feed is derived in Hodansh and Woyntma kebeles than Menkusa-Abdegoma and Bakel-Abater within the *weina-dega* kebeles and Guay-Yewbshet kebele within the *Sub-Kola* kebeles, respectively. Cattle were the dominant livestock species accounted for about 58.9% of the average total livestock holding in terms of number per household. Available cattle breeds kept in the study area were undisruptive local cattle and Horro cattle breed with the later being especially found in the *Sub-Kola* kebeles. Chi-square (χ^2) correspondence analysis showed that there was no significant difference ($P > 0.05$) in the purpose of livestock holding between the two agro-ecologies.

*Animals use different purpose Milk & Meat and

TABLE 1
Average livestock holding per household in Jabitehnan District

	Weina-Dega										Sub-kola										Overall				
	Zaba		Hodansh		Mana		Menkusa		Jimat		Wongie		Bakel		Abater		Average		Weynma		Guay		Average Overall		
	N=11	LH	N=16	M±SEM±SE	N=14	M±SE	N=11	M±SE	N=15	M±SE	N=12	M±SE	N=14	M±SE	N=93	M±SE	N=13	M±SE	N=14	M±S	N=27	M±SE	N=120	M±SE	%
Cow	1.38±0.25		2.20±0.28		1.83±0.48		1.0±0.00		1.43±0.31		1.64±0.34		1.25±0.16		1.51±0.13		2.25±0.25		1.00±0.21		1.45±0.21		1.49±0.11		
Heifer	0.90±0.30		1.42±0.19		1.40±0.40		1.0±0.00		1.21±0.28		0.90±0.28		1.40±0.24		1.05±0.13		1.88±0.30		0.36±0.13		0.90±0.21		1.01±0.10		
Bull	1.00±0.12		2.00±0.00		1.89±0.31		1.2±0.20		0.78±0.33		1.00±0.30		1.25±0.16		1.10±0.12		1.67±0.33		0.64±0.17		0.95±0.18		1.06±0.10		
Ox	2.05±0.11		2.50±0.22		1.62±0.18		1.12±0.12		2.14±0.25		2.92±0.26		1.33±0.17		1.92±0.10		2.45±0.28		1.86±0.23		2.17±0.18		1.96±0.09		
Calves(male)	0.28±0.07		1.70±0.26		-		2.0±0.00		0.36±0.13		0.22±0.15		1.00±0.00		0.64±0.12		1.20±0.20		0.07±0.07		0.37±0.14		0.55±0.09		
Calves(female)	0.38±0.09		1.28±0.18		-		1.0±0.00		0.43±0.20		0.56±0.24		1.00±0.00		0.57±0.11		1.40±0.40		0.07±0.07		0.42±0.18		0.52±0.09		
FC	1.48±0.10		1.11±0.11		1.37±0.3		1.2±0.13		1.42±0.19		1.36±0.20		1.20±0.13		1.34±0.11		2.14±0.26		1.27±0.14		1.52±0.14		1.38±0.12		
TCP	4.27±0.43 ^{bc}		7.5±0.87 ^a		4.00±0.71 ^{bc}		2.0±0.18 ^d		6.36±1.51 ^{ab}		6.58±1.34 ^{ab}		3.07±0.38 ^c		4.82±0.45 ^b		6.38±0.93 ^{ab}		4.00±0.88 ^{bc}		4.72±0.85 ^b		4.82±0.40		58.9
Sheep	1.25±0.18		2.80±0.71		2.00±0.26		3.5±1.50		0.78±0.43		0.75±0.30		-		1.38±0.22		2.14±0.40		1.64±0.57		1.81±0.40		1.50±0.19		18.3
Goat	0.83±0.36		4.00±2.52		1.75±0.75		-		1.71±1.34		0.22±0.22		-		1.22±0.52		3.00±1.15		-		0.53±0.33		1.00±0.37		12.2
Donkey	0.71±0.09		1.00±0.00		1.71±0.28		-		0.21±0.15		0.80±0.20		1.00±0.00		0.63±0.11		1.20±0.20		0.78±0.11		0.90±0.10		0.73±0.09		8.90
Mule	0.06±0.04		1.00±0.00		-		1.0±0.00		0.14±0.10		-		-		0.16±0.06		-		0.07±0.07		0.07±0.07		0.13±0.05		1.70
TLP	6.18±0.86b		10.44±1.79 ^a		6.78±1.25 ^b		2.73±0.45 ^c		9.21±3.54a		8.17±1.98 ^a		3.14±0.38 ^c		6.61±0.89 ^b		8.69±1.49 ^a		6.49±1.64 ^b		7.16±1.48 ^b		6.73±0.79		100

N= number of respondents, LH= Livestock holding, TCP= Total cattle population per household, TLP= Total livestock population, FC= Fattened Cattle, abcd= Means with different superscript within a row are significantly different (P<0.05).

TABLE 2
Ranking of purposes of livestock holding in Jabitehnan district

Purposes	Respondents rank (%)												
	<i>Weina-Dega</i>				<i>Sub-kola</i>				Overall				
	1 st	2 nd	3 rd	4 th	1 st	2 nd	3 rd	4 th	1 st	2 nd	3 rd	4 th	rank
Milk	8.6	17.2	34.4	40	-	14.8	57.7	30.8	6.7	16.7	39.5	35.4	3
Meat	3.2	12.9	30	56	-	3.7	26.9	69.2	2.5	10.8	29.4	59	4
Draught	65.6	19.4	6.4	4	55.6	29.6	15.4	-	63.3	21.7	8.4	5.6	1
Sources of income	22.6	50.5	29.2	-	44.4	51.9	-	-	27.5	50.8	22.7	-	2
N	93	93	93	84	27	27	26	26	120	120	119	110	

N= Number of respondents.

ranked based on Weina-Dega and Sub-kola farmers ranked

Major feed resources for fattening cattle

Feed resources for fattening cattle were seasonally available green pasture including improved forages and weeds grown within and at the boundary of the farm land and the homestead; leaf strip, thinning and sterile maize plant; maize cob (including the internal hard structure, grain, and green covering leafy part); pasture grazing, crop-residues particularly maize Stover and stubble grazing.

According to the response of households, among the major basal feeds given for the fattening cattle, fresh cut green forage took the higher proportion (63.3% of the respondents), followed by maize Stover, pasture grazing, and hay with 22.4%, 9.7% and 5% of the respondents, respectively. However, major basal feeds in *Sub-Kola* agro-ecology were fresh cut green forage (64.8%), maize Stover (22.8%), pasture grazing (9.6%) and hay (2.8%). Where as in *Weina-Dega* agro-ecology the major basal feeds were fresh cut green

forage (58.2%), maize Stover (21.2%), hay (12.4%) and pasture grazing (10.1%). From the feed supplements given to the fattening cattle in the study area, maize grain with its cob was the leading feed supplement which accounted for about 42.6% and was followed by local brewery byproducts (27.9%), oil seed cake (18.2%), chopped pumpkin (6.1%), and mixed ration prepared at home (5.2%).

Utilization of chopped pumpkin was significantly higher ($P<0.05$) in *Sub-Kola* agro-ecology (12.5%) than in *weina-dega* agro-ecology (4.3%). About 26.7% of the households did not provide supplementary feed for their fattening cattle due to different reasons. The reasons pointed out by the respondents include higher cost (73.7%) and unavailability in the area (26.3%). According to discussions held with focused groups, currently the cost of 1 kg oil seed cake and 1 kg maize in the study area is birr 0.80 and 4.40 respectively. This may be difficult particularly for those who lack capital. There is no oil seed processing plant in most places of the district. Only Finoteselam and Jiga have a limited number of oil seed processing plants.

TABLE 3
Livestock Feed Resources in the Dry season

FR	Respondents rank (%)																					
	<i>Weina-Dega</i>							<i>Sub-kola</i>							Overall							
	1 st	2 nd	3 rd	4 th	5 th	6 th	7 th	1 st	2 nd	3 rd	4 th	5 th	6 th	7 th	1 st	2 nd	3 rd	4 th	5 th	6 th	7 th	R
NP	2.2	3.2	41.8	7.5	3.7	-	-	3.7	14.8	52	-	4.8	-	-	2.5	5.8	44.6	5.5	4	-	-	3
IF	-	1.1	4.5	6	1.8	28.6	67.8	-	-	-	-	14.3	23.8	56.3	-	0.8	3.3	4.4	5.3	26.9	63.6	7
CR	64.5	26.9	6	3	1.8	-	-	96.3	-	4	-	-	-	-	71.7	20.8	5.4	2.2	1.3	-	-	1
SG	21.5	40.9	13.4	6	18.5	19	14.3	-	63	-	20.8	-	-	-	16.7	45.8	9.8	9.9	13.3	12.7	9.1	2
Hay	9.7	18.3	11.9	17.9	27.8	4.8	-	-	22.2	20	4.2	57.1	28.6	-	7.5	19.2	14	14.2	36	12.7	-	5
FS	2.2	6.4	7.5	28.4	24.1	40.5	17.9	-	-	20	8.3	14.3	38	31.2	1.7	5	10.9	23.1	21.3	39.7	22.7	6
BT	-	3.2	14.9	31.3	22.2	7.1	-	-	-	4	66.7	9.5	9.5	12.5	-	2.5	9.2	40.7	18.7	7.9	4.6	4
N	93	93	67	67	54	42	28	27	27	25	24	21	21	15	120	120	92	91	75	63	44	

FR=Feed Resources, NP= Natural Pasture IF= Improved Forage CR= Crop Residue SG= Stubble Grazing FS=Feed Supplement BT=Browse Tree R= Ranks N= Total number of respondents.

TABLE 4
Livestock Feed Resources in the Wet season

FR	Respondents rank (%)																					R
	Weina-Dega							Sub-kola							Overall							
	1 st	2 nd	3 rd	4 th	5 th	6 th	7 th	1 st	2 nd	3 rd	4 th	5 th	6 th	7 th	1 st	2 nd	3 rd	4 th	5 th	6 th	7 th	
NP	62.4	29	14.3	-	-	-	-	66.7	16	4.2	4.5	-	-	-	63.3	26.3	11.9	1.5	-	-	-	1
IF	-	-	13	13.6	12.5	13.9	46.2	-	-	8.3	4.5	15	27.8	50	-	-	11.9	10.6	13.3	18.5	47.8	7
CR	33.3	37.6	18.2	6.8	2.5	-	-	14.8	28	4.2	22.7	5	-	-	29.2	35.6	14.8	12.1	3.3	-	-	2
SG	2.2	3.2	2.6	27.3	2.5	-	-	7.4	16	12.5	36.4	10	-	-	3.3	5.9	4.9	30.3	5	-	-	4
Hay	1.1	18.3	27.3	6.8	5	5.6	-	11.1	24	41.7	4.5	15	5.6	-	3.3	19.5	30.7	6.1	8.3	5.6	-	3
FS	1.1	3.2	15.6	25	27.5	58.3	30.7	-	12	4.2	4.5	20	44.4	30	1.7	5.1	12.9	18.2	25	53.7	30.4	6
BT	-	8.6	9.1	20.5	50	22.2	23.1	-	4	25	22.7	35	22.2	20	-	7.6	12.9	21.2	45	22.2	21.7	5
N	93	93	77	44	40	36	13	27	25	24	22	20	18	10	120	118	101	66	60	54	23	

FR=Feed Resources, NP= Natural Pasture IF= Improved Forage CR= Crop Residue SG= Stubble Grazing FS=Feed Supplement BT=Browse Tree R= Ranks N= Total number of respondents.

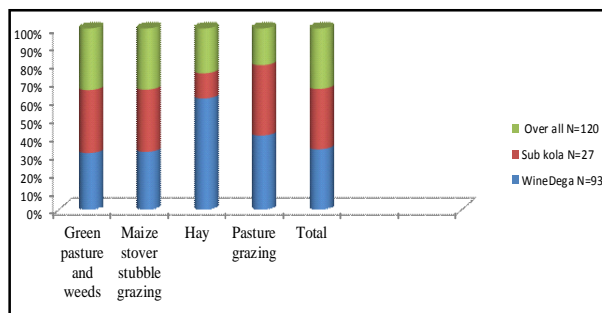


Fig. 2. Major feed resources for fattening cattle in Jabitehnan.

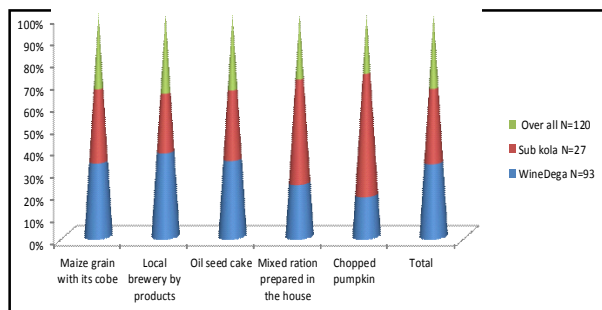


Fig. 3. Major feed supplements given for fattening cattle

Feeding system for fattening cattle

The feeding system in fattening cattle was different from other livestock species. Free grazing is practiced for all livestock species by negatively affecting soil and water conservation practices. However, for fattening cattle in addition to free grazing; tethering, stall-feeding or both are practiced. In the morning (before 10 AM) and after 4 PM, the fattening cattle are released to graze freely on the boundaries of croplands. However, between 10 AM and 4 PM the fattening cattle are tethered under the trees or near the barn or stall in the barn and fed either the basal feeds or supplements. Correspondence

TABLE 5
Percentage of Different Types of Feeding Systems for Fattening cattle

Feeding systems	Weina-Dega N=93	Sub-kola N=27	Overall N=120
Mixed (free grazing, tethering and stall feeding)	47.1	34.8	44.6
Stall feeding	40.2	30.4	38.2
Tethering	3.4	26.1	8.1
Tethering and Stall feeding	6.9	8.7	7.3
Free grazing	2.3	0	1.8
Total	100	100	100

N= Number of respondents.

analysis of chi-square (χ^2) indicated that tethering was more practiced ($P < 0.05$) in the Sub-kola than in the weina-dega. This could be due to the lack of family labor in the sub-kola taking the fattening cattle and tethering when weeding or harvesting or keeping the crops on cultivated land is a common practice in the Sub-kola than in the weina-dega.

Sources of fattening cattle

The sources of fattening cattle were immediate purchase for fattening (55.7%), culled oxen due to old age or un productivity (34.6%) and both culled oxen and immediate purchase (9.7%).

N=Number of respondents

The source of fattening cattle from culled oxen due to old age or being unproductive (34.6%) in the current study was lower than (51%) reported by (Shitahun, 2009) in Burie district. The source fattening cattle from immediate purchase was significantly

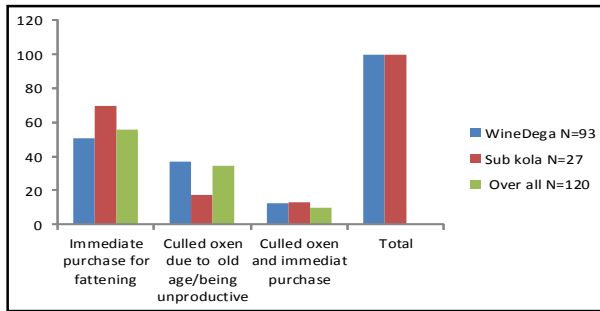


Fig. 4. Sources of fattening cattle in Jabitehnan district.

higher ($P < 0.05$) than from culled oxen due to old age or being unproductive. This may be due to the reason that smallholders are realising the benefits of fattening practices into account. Chi-square (χ^2) correspondence analysis test showed that culled oxen were used for fattening more in the weina-dega than in the sub-kola. This may be due to the lack of enough capital available in the weina-dega limits the participants to purchase cattle for fattening.

Type and Selection criteria of fattening cattle

When smallholders in study are purchase cattle for the purpose of fattening, they considered type of animal, sex, age, productivity and other characteristics (Body size/frame; Health; Body condition; Price; Color; Adaptation and presence or size of the Horn).

The criteria smallholders used when purchasing cattle for fattening were ranked in Table 7.

Chi-square (χ^2) correspondence analysis test showed that there was no significant difference ($P > 0.05$) in the use of the above-mentioned criteria

when purchasing between the two agro-ecologies. The type of animal smallholders selected for fattening were cattle, cattle and sheep, sheep and all cattle, sheep and goats in the descending order as shown in Table 7.

TABLE 7

Type of Animal Selected for Fattening in Jabitehnan district

Type of animal selected for fattening	Weina-Dega N=93	Sub-kola N=27	Average for fattening N=120
Cattle	78.0	72.0	76.7
Sheep	5.5	4.0	5.2
Cattle and sheep	14.3	24.0	16.4
Cattle, sheep and goats	2.2	-	1.7

N= Number of respondents.

Correspondence analysis of chi-square (χ^2) test showed that there was no significant ($P > 0.05$) different in the type of animal being selected for fattening between the two agro-ecologies. However, selecting cattle for fattening was significantly higher ($P < 0.05$) than sheep, both cattle and sheep and all cattle, sheep and goats. The general reasons indicated by respondents why they preferred cattle for fattening were having better profit (67.6%), shorter fattening

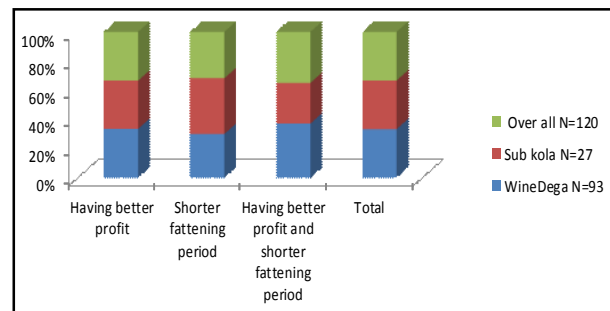


Fig. 5. Reasons for preferring cattle than sheep and goats.

TABLE 6

Criteria used for selection when purchasing cattle for fattening in Jabitehnan district

Criteria breed selection & purchasing	Respondents rank in number									
	1 st	2 nd	3 rd	4 th	5 th	6 th	7 th	8 th	9 th	R
Age of cattle	12	33	16	19	15	6	3	1	1	2
Body size or frame	63	29	17	5	3	-	-	-	-	1
Breed	-	-	-	-	-	-	-	9	11	9
Health	18	15	26	15	15	6	-	-	-	3
Body condition	24	12	13	10	10	20	3	1	-	6
Price	2	16	14	13	16	10	9	-	-	5
Color	1	8	22	23	7	7	5	3	-	4
Adaptation	-	5	10	6	15	13	19	3	-	7
Presence or size of the horn	-	2	2	9	8	5	10	20	6	8
Total number of respondents	120	120	120	100	89	67	49	37	18	

R= Overall Ranks.

period (18.5%) and both better profit and shorter fattening period (13.9%).

Chi-square (χ^2) correspondence analysis indicated that there was no significant ($P>0.05$) difference in the reasons why cattle were more preferred than sheep and goats between the two agro-ecologies. The reason having better profit was significantly higher ($P<0.05$) than shorter fattening period or both better profit and shorter fattening period. This may be due to according to discussions held with focused groups in each kebeles; the reason why fattening cattle fetching better profit than sheep and goats was that fattening one cattle earned better profit than two sheep or goats. According to focused group discussions and as observed in practical situation; cattle have shorter fattening period than sheep and goats. The reasons for these are at farmers' management level with the available low quality and quantity feed resources, sheep and goats required longer fattening period than cattle.

On the one hand, culturally purchasing of sheep and goats for fattening focuses on uncastrated or younger sheep and goats and fattening and selling them after castration and maturation may take longer period (as long as half or a year in most cases). In the study area, with regard to sex preference for fattening, males (99.1%) were more preferred ($P<0.05$) to females (0.9%). The reasons suggested by the respondents were that males have shorter fattening period (37.7%), high market demand and shorter fattening period (16.9%), higher market demand

(14.4%), greater body size and culturally more acceptable (9.75%), dual purpose (plowing on the way of fattening) (8.6%), fetch better profit (6.48%) and all higher market demand, shorter fattening period and fetch better profit (6.17%).

Correspondence analysis of Chi-square (χ^2) test showed that there was no significant ($P>0.05$) difference in the reasons behind why males were preferred to females between the two agro-ecologies. Respondents' response showed that when purchasing cattle for fattening, smallholders use age and productivity of cattle as **criteria of selection**.

Length of fattening period

Five fattening lengths have been identified in the study area. These were 2 months (12.5%), 3 months (50%), 3.5 months (20.5%), 4 months (14.3%) and 4.5 months (2.7%) of the fattening period. However, fattening lengths in *Sub-Kola* agro-ecology were 3 months (72.7%), 3.5 months (13.6%) and 4 months (4.6%). Whereas in *weina-dega* agro-ecology the fattening lengths were 2 months (13.3%), 3 months (44.4%), 3.5 months (22.2%), 4 months (16.7%) and 4.5 months (3.3%). The mean fattening lengths were not significantly different ($P>0.05$) between *Sub-Kola* (94.4 days) and *weina-dega* (97.8 days) agro-ecologies. This may be due to the use of similar type of basal feed resources and supplements. From the fattening lengths, 3 months (50%) and 3.5 months (20.5%) are optimum. This may be due to most of the cattle fattening (78.2%) was carried out starting from mid- August when green pasture and supplementary feed particularly maize grain with its cob and chopped pumpkin are available (Shitahun, 2009) also reported that fattening cattle fed with supplementary feed would finish within 3 to 3.5 months of feeding lengths. The average length of fattening in this study was estimated to be 97 days.

Season of cattle fattening

According to the response of smallholders and discussions held with focused groups in each kebeles, cattle fattening was dependent on season by considering the resources available in the area such as feed, labor and market demand. Season of cattle fattening had no significant difference between the two agro-ecologies. About 78.2% of the cattle fattening practice was carried out starting from mid-August and in areas where chickpea agriculture is practiced, about 17.6% of cattle fattening practice is done starting from

TABLE 8
Reasons for males preferring to females for fattening

Reasons suggested	Percent of respondents		
	Weina-Dega N=93	Sub-kola N=27	Average N=120
High market demand	13.1	18.8	14.4
Shorter fattening period	39.1	33	37.7
High demand and shorter fattening period	14.5	25.2	16.9
Fetch better profit	6.5	6.4	6.48
High demand, shorter fattening period and fetch better profit	7.6	6.2	6.17
Greater body size and culturally preferred	10.2	8.2	9.75
Having dual purpose use (plowing and fattening)	8.1	10.2	8.6
Total	100	100	100

N= Number of respondents.

October. The reasons for both cases are availability of enough labor due to the plowing activity was finished, optimum feed supply on the specified periods and the need to supply fattened cattle for Christmas and Epiphany.

TABLE 9
Reasons of most smallholders to start cattle fattening Mid-August

Reasons to start fattening on Mid-August	Respondents in %		
	Weina-Dega N=93	Sub-kola N=27	Average N=120
Availability of enough feed resources	63.9	67.6	64.7
Availability of labor	1.3	11.1	3.1
Availability of feed and labor	30.4	16.7	27.8
Supplying for Christmas and Epiphany	4.4	4.6	4.4
Total	100	100	100

N= Number of respondents.

The remaining 4.2% of the cattle fattening is carried out starting from January to April aiming to supply fattened cattle for Easter. The low percentage of cattle fattening during Easter was due to feed scarcity, lack of labor, lack of capital (most smallholders invest their money on agricultural inputs such as fertilizer, improved seed and even they purchase oxen for plowing). Due to the high demand of cattle for plowing; there is increase in price of cattle for fattening purpose and there is also low market demand for fattened cattle compared to Christmas and Epiphany because during Easter slaughtering and consumption of sheep and goats was more common practice than fattened cattle. Starting from May (after Easter) up to early August, cattle fattening is totally absent in the study district. Correspondence analysis of chi-square (χ^2) test showed that the possible reasons for the absence of cattle fattening during the specified period were ranked from 1st up to 6th as feed scarcity, high demand of family labor for other agricultural activities, high demand of oxen for plowing, lack of capital due to the high demand of agricultural input, dampness of feeding areas and low market demand for fattened cattle in the descending order.

Constraints of Cattle Fattening

As per the result of semi-structured interview supported with focus group discussions held in each of the study kebeles, the major constraints that

TABLE 10
Possible reasons for absence of cattle fattening from May to August in Jabitehnan district

Reasons	Respondents rank (No)						R
	1 st	2 nd	3 rd	4 th	5 th	6 th	
High demand of oxen for plowing	35	23	43	19	-	-	3
Feed scarcity	47	35	38	-	-	-	1
High demand of family labor	38	62	20	-	-	-	2
Dampness of feeding area	-	-	6	33	52	29	5
Low demand for fattened cattle	-	-	-	28	41	51	6
Lack of capital	-	-	13	40	27	40	4
Total number of respondents	120	120	120	120	120	120	

R= Overall Rank.

hindered the performance of cattle fattening activity in both agro-ecologies were mentioned as feed shortage, lack of enough capital and credit, shortage of family labor, animal health problems, lack of extension service, institution and capacity, and markets and marketing in order of importance as listed in the next sections. Feed shortage and coping mechanisms according to the respondents', smallholder-fattening practices are extremely dependent on seasonal of feed availability. One major reason smallholders started cattle fattening from Mid-August onwards was the availability of enough feed resources. Results of Chi-square (χ^2) correspondence analysis indicated that there was no significant difference ($P>0.05$) in the dependency of smallholder fattening practices on feed resource availability between the two agro-ecologies. According to the response of household survey and discussions held with focused groups, about 80.6 % of the respondents had livestock feed shortage.

Correspondence analysis of chi-square (χ^2) test showed that there was no significant difference ($P>0.05$) in lack of feed resources between the two agro-ecologies. Lack of feed resources had correlation coefficient -0.007 with agro-ecology. It was also showed that feed shortage was more limiting ($P<0.05$) the number of fattening cycles per year than lack of capital, shortage of labor, lack of capital and feed, lack of capital and labor, lack of feed and labor and lack of all feed, labor and capital. According to the respondents and focused group discussions, feed shortage was serious during March, April, May and

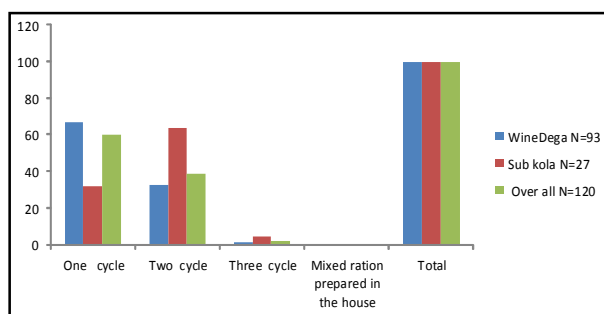


Fig. 6. Number of fattening cycles per year in Jabitehnan District.

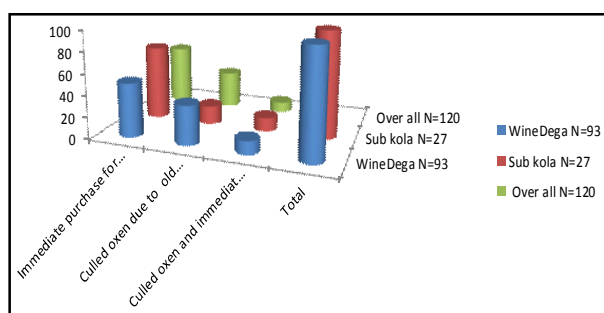


Fig. 7. Sources of fattening cattle in Jabitehnan district.

June. Feed shortage, lack of labor and capital was affecting the number of fattening cycles per year and force most smallholders to practice one fattening cycle per year as shown figure 6.

Feed scarcity in the study area was primarily affecting the number of fattening cycles per year (55.4%) followed by 16.9% together with lack of capital, 5.2% together with lack of labor and 2.3% together with both lack of capital and labor.

Therefore, strong extension service and sound training on forage production, preservation, collection and utilization techniques as well should be delivered to smallholders in order to be benefit from full cycle fattening per year and to bring about real changes in food security and to improve the incomes or benefits of the poor through livestock development.

Lack of extension service

Lack or absence of extension service is one of the main hindrance smallholders were facing similar to Berhanu *et. al.* (2007) who reported that the coverage of the service is too limited relative to the need. According to the responses of households, the major reasons of lack of extension service in the district are lack of professionals, discontinuous service by extension personnels, livestock professionals spend most of their working time on another disciplines (such as SWC practices, compost preparation, and input distribution), and the professionals spend most of their

TABLE 11
Reasons for one or two fattening cycles per year in Jabitehnan District

Reasons of one or two fattening cycle per year	Weina-Dega N=93	Sub-kola N=27	Overall N=120
Feed shortage	55.9	53.3	55.4
Lack of labor	5.9	20	8.4
Lack of capital	10.3	-	8.4
Lack of feed resources and labor	5.9	2.2	5.2
Lack of feed resources and capital	17.6	13.3	16.9
Lack of labor and capital	2.9	5.6	3.4
Lack of feed resources, labor and capital	1.5	5.6	2.3
Total	100	100	100

N=Number of respondents.

TABLE 12
Respondents rank showing the coping mechanisms of feed shortage in Jabitehnan District

Coping mechanisms	Respondents rank in number					
	1 st	2 nd	3 rd	4 th	5 th	6 th
Storing crop residue during available	92	13	10	5	-	-
Hay making	16	56	19	14	-	-
Destocking	3	5	15	11	15	21
Using browse trees	1	16	39	25	9	3
Purchasing feed supplement	4	20	23	31	33	10
Traveling animals to borders of springs, Rivers and irrigation practices	4	10	14	34	13	12
Number of respondents	120	120	120	120	70	46

TABLE 13
Reasons for lack of extension service in Jabitehnan district

Reasons for lack of extension service	Respondents Rank in number				
	1 st	2 nd	3 rd	4 th	R
Discontinuous extension service	32	42	21	25	2
Lack of professionals Livestock professionals spend most of their	49	31	26	14	1
Working time on another disciplines	17	23	33	47	4
The professionals spend most of their time on their own private investment	22	24	40	34	3
Number of respondents	120	120	120	120	

R= Overall rank.

time on their own private investment ranked in the descending order, respectively (Table 12).

The coverage of livestock professionals from the total expected livestock professionals is shown in Table 13. According to the observation made at sample kebeles, the available professionals in each Department was 88.9% for crop production, 66.7 % for Natural resource and 44.4% for livestock production.

Opportunities

Irrigation practices : According to the respondents' and observations made at sample kebeles in the district, irrigation practices are widely carried out on the major rivers passing across the district namely Lah, Dahbolla, Kechem, Birr and Tikurwuha. The practices are favorable not only to crop production but also to forage production. According to discussions held with focused groups, there is a general increasing trend in land for irrigation from year to year. In addition, a number of projects and programs have come to the district for building irrigation dams in addition to other activities, namely Facilitator for Change Ethiopia (FCE), Agriculture Sector Support Project (ASSP), Agriculture Growth Program (AGP), Sustainable Land Management (SLM), and International Fund for Agricultural Development (IFAD). In this regard, the amount of feed available to livestock during the dry season is an advantage to smallholders. Therefore, the irrigation practices carried out by smallholders could minimize livestock feed shortage and increasing pasture and crop residue availability during the dry season. Thus, this could be an opportunity to overcome the problem of feed shortage. There is high crop production such as maize wheat, teff and different grains.

CONCLUSION AND RECCOMENDATIONS

Crop residue and natural pasture were the major feed resources during dry and wet seasons, respectively, in both agro-ecologies. The type of feed resources were not significantly ($P>0.05$) different between the two agro-ecologies. Of the basal feeds given for the fattening cattle, fresh cut green forage took higher proportion followed by maize stover, hay and pasture grazing, respectively. The three types of houses that are used to keep the fattening cattle are separated house in the family house, enclosed barn with simple shade and

house together with humans in the descending order. The sources of fattening cattle are immediate purchase for fattening, followed by culled oxen due to old age or being unproductive and both culled oxen and immediate purchase. Type, sex, age, body size/frame, health, body condition, price, color, adaptation and presence or sizes of the horn are selection criteria when purchasing cattle for fattening. Cattle are the most preferred type of animals for fattening to sheep and goats. With regard to sex, males are more preferred for fattening than females. The type of cattle selected for fattening are old oxen, matured oxen, old and unproductive cows, young bulls and heifers in the descending order. From these, it was concluded that the type of cattle selected for fattening are more dependent on age and productivity that means older and unproductive cattle are more preferred by smallholders for fattening than young and productive ones.

Cattle fattening was dependent on season by considering the available resources in the area such as feed, labor and demand on market. Most of the cattle fattening practices are carried out starting from Mid-August, starting from October, and from January to April in the descending order. The average length of fattening in the current study was estimated to be 97 days. Feed shortage, lack of enough capital and credit, shortage of family labor during seasons of peak agricultural practices, animal health problems, lack of extension service, institution and capacity, and markets and marketing were the constraints that hindered cattle fattening in order of importance. Feed scarcity, lack of labor and lack of capital were limiting the number of fattening cycles per year and number of fattening cattle per cycle. Lack of enough credit, which was one of the coping mechanisms against lack of capital to carry out the practices, was also a constraint to smallholders. Distance of animal health service delivery centers and inability to get service on time are the most prominent problems smallholders were facing. High irrigation potential of the area, private colleges in the department of animal health, upgrading of livestock production and health from Department to Agency, local and regional demands of meat and live animal are the most important opportunities for fattening practices. In general, it can be concluded that even though the cattle fattening practices carried out by smallholders are more of traditional; it could be one potential strategy to improve the income of smallholders if the present existing constraints could be solved.

Recommendations

Based on the above conclusion, the specific recommendations are:

- Due consideration should be given to FTCs by considering as farmers' school to promote the farmers from their traditional fattening practices and a lot should be done on training farmers on forage development and proper utilization to bring about real changes in food security and to enhance the incomes and benefits of the poor through livestock development.
- Attention should be given to access to enough credit and the amount of credit being received should be revisited. In addition due consideration also should be given to credit institutions and cooperatives as they should not act not only as profit orienters but also development partners and they should receive the share for enhancing the incomes and benefits of smallholders through cattle fattening practices.
- A lot should be done to balance animal health service delivery techniques on all the outreach of the service delivery centers and more attention should be given to areas that are more prone to animal health problems.
- Attention should be given to assigning livestock professionals in all kebelles and the monitoring and evaluation techniques of extension personnels' should be also reviewed.

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