Traditional Backyard Cattle Fattening in Wolayta: Systems of Operation and the Routine Husbandry Practices

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Abstract

Traditional backyard cattle fattening is a deep-rooted and widely practiced cattle enterprise in Wolayta, although it is by and large a seasonal undertaking. This practice is synchronized with the existing farming system as it almost entirely relies upon locally available resources to minimize finishing costs. This study was conducted to characterize traditional backyard cattle fattening system in Wolayta. Semi-structured questionnaire, focus group discussions and key informant contact were used to generate the data set. According to our findings selection of fattening cattle mainly depend on the physical appearance of the animal. The average length of fattening period was 3.88±1.18 month with a range of 2 to12 months. The average number of fattening cycle per year was 1.55±0.55 with a range of 1 to 3. The reported average number of stall-fed cattle per cycle was 1.27±0.52 with a range of 1 to 4. Our studies showed that cut grass is used as basal feed whereas green cereal grains, root and tuber crops, household leftovers, agro-industrial by-products and others make 43.62, 35.29, 10.20, 5.98 and 4.92% of the supplementary feed, respectively. However, the use of agro-industrial by-products is a very recent practice. Respondents' categorization of the feed based on level of abundance indicates that sweet potato and green maize ranked high. However, the reverse is true for nutritional quality ranking. Feeding regime evolved in Wolayta uses different types of treatments making the feed more palatable and day-night feeding is a common practice. Average daily water intake during dry and wet seasons was 12.52±6.51 and 5.21±3.42 liters, respectively. A mineral lick called *adua* is used as mineral supplement by all the respondents. The fattening practice usually reaches its peak from June to September. Fattening cattle are kept in a compartment as part of the farmer's residence to protect from theft, adverse weather and predators. Since cattle fattening is solely based on stall-feeding a significant amount of labor is invested by adult family members to maximize the profit of the fattening operation. Results showed that the use of locally available feed is a growing practice in Wolayta, however, further work is needed to develop a cost effective feeding strategy, and a ration formulation for finishing cattle.

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Introduction

Even though it is by and large a seasonal undertaking, traditional backyard cattle fattening is a deep–rooted and widely practiced cattle enterprise in Wolayta. Such types of cattle fattening practices which are synchronized with seasonal feed availability are reported in literature (Thomas and Addy, 1977; Thomas–Peterhans, 1982; Fekadu and Alemu, 2000). This is because feed undoubtedly constitutes the principal component of total cost of fattening (Cordiez *et al*., 1977; Fourie *et al*., 2006) and therefore feed costs and the level of use are considered as key components of profitable cattle fattening (Hadi *et al*., 2002).

In view of the prevailing feed price, much effort needs to be made to develop the ways of using locally available and relatively cheaper feed sources. Cattle fattening in Wolayta is largely based on non-conventional feed resources and uses locally-innovated feeding strategies. This strategy is useful to optimize the use of locally available feed resources and a comparable type of feeding system was reported by Fekadu and Alemu (2000) for smallholder farmers in east Ethiopia. Therefore, much needs to be learnt to promote the expansion, improvement, adoption of this type of feeding strategy for a much wider use across the country.

Type and amount of feed, condition of the fattening cattle prior to stall-feeding and day to day management of the animal determine the length of fattening period. Therefore, scarcity of feed, animal in poor condition before fattening and improper management prolong the finishing period. Longer fattening periods tie up capital, which in turn significantly reduces profit realized from cattle finishing (Ebrahim *et al*., 2004). For example, purchasing healthy cattle which is in good body condition ties up capital for relatively short period of time and reduces operation costs (Ebrahim *et al*., 2004). This in turn requires the knowledge of selecting the appropriate animal.

All these conditions require generating information on appropriate feeding and management strategies for backyard cattle fattening. Therefore, scaling out and scaling up of the already adopted traditional stall-fed cattle fattening systems by the rural poor is a way for poverty reduction by increasing the productivity of the cattle industry (UNDP, 2003). In response to this concern,

study was conducted to document peculiar characteristics of Wolayta cattle fattening system.

Materials and Methods

The study area

Wolayta Zone is located in south Ethiopia between geographical coordinates of 6.4^0–7.1^0 N latitude and 37.4^0–38.2^0 E longitude (WZFEDD, 2005). It has a total area of 3982km^2 (Tesfaye, 2003). Its altitude ranges from 1200 to 2950 meters above sea level and is subdivided into three ecological zones: kolla or lowland (35%), woina dega or intermediate highland (56%) and dega or highland (9%). Wolayta has a bimodal rainfall pattern with major and minor rainy seasons mostly lasting from July to October and March to May, respectively. Average total annual rainfall is 1014mm and the mean daily temperature is
19.5 ^{0}c (WZFEDD, 2005). According to Westphal (1975) Wolayta has *enset*–based mixed crop-livestock farming system, where *enset* is the co–staple food together with cereals, root and tuber crops (Tesfaye, 2003). Like other mixed crop livestock production systems in Ethiopia, livestock production is an integral part of the farming system. According to WZFEDD (2005) report Wolayta Zone has 682178 head of cattle.

Sampling procedures and methods of data collection

A reconnaissance tour was made in advance to familiarize with the existing farming system. Field observation, 12 focus group discussions, 8 key informant contacts, wayside informal talks and secondary data sources were used to collect basic information. A single–visit survey was then carried out from January to July 2006 in four districts of Wolayta Zone–Damot Gale, Soddo Zuria, Humbo and Offa representing dega, woina dega and kolla agro–ecological zones. The 12 focus group discussions (3 for each study district) were guided by the following sets of questions: the historical development of cattle fattening practice; trends of the fattening practice *i.e* is it increasing, decreasing or static? Constraints and opportunities of cattle fattening; the unique practices of Wolayta cattle fattening, and the type of feed resources used for fattening.

Further stratification of the study districts was made based on agro–ecology and cattle fattening practices such as highland and lowland fattening systems that mainly differ in the type of the principal feeds used. Random sampling frame was developed to select representative villages and households from each stratum. A semi–structured questionnaire pre–tested in 3 sites was then

administered on 164 study households' selected using systematic sampling from Peasant Associations' farmers list record book (Table1).

Table1. Respondents' summary by district and agro-ecological zone and number of sampled villages in each district.

District	Agro-ecological zone			Sampled villages
	Kolla	Woina Dega	Dega	
Damot Gale	-	40	10	10
Soddo Zuria	-	31	11	8
Humbo	24	12	-	6
Offa	12	18	6	6

Data management and analysis

SAS (2002) software was used to analyze quantitative and qualitative data using descriptive statistics and GLM procedures and graphic presentation was made by using Microsoft Office Excel 2003.

The proc GLM was used for the analysis of three dependent variables: the length of fattening period, number of fattening cycles per year and number of fattened cattle per cycle as indicated in the following model:

$$y_{ijk} + = \mu + d_i + a_j + s_k + e_{ijk}$$

Where the response variable y_{ijk} is length of fattening period, number of fattening cycles per year or number of animal fattened per cycle; μ is the overall mean; d_i refers to study districts (4 levels), a_j refers to agro-ecological zones (3 levels), s_k refers to sex of the respondent (2 levels) and e_{ijk} refers to residual term.

Age of the respondents and district by agro-ecological zone interaction are found statistically insignificant for all dependent variables and hence they were dropped from the model. Moreover, agro-ecological zone and sex were found significant for length of fattening period only, however for the sake of comparison agro-ecological zone was kept in the model during analysis of number of fattening cycles per year and number of animal fattened per cycle.

Results

Selection of cattle

Cattle fatteners in Wolayta select cattle those have better body condition for fattening and have attractive look that would get market demand (*e.g* coat color). The reported selection criteria are mainly based on physical appearance of the animal (Table2). However, it was reported that cattle with different age and body condition are purchased for fattening and this would result in a considerable variation in the level of fattening.

Table 2. Reported selection criteria of fattening cattle

Selection criteria	Freq	%	Selection criteria	Freq	%
Wide & deep body	255	32.94	Thick neck	29	3.75
Big & stand-high hump	127	16.41	Long tail	14	1.81
Height	114	14.73	Lean but healthy	11	1.43
Good body condition	74	9.56	Well matured	10	1.29
Length	55	7.10	Thin skin	6	0.78
Glossy coat	38	4.91	Others*	9	1.16
Medium, thick and up-right horn	32	4.13			

*Intact tail, low cost, animal that was reared in comparable agro-ecological zone, animal staying on draft work for 2 to 3 years (mimics the idea of compensatory growth).

The fattening system

It was reported that the length of fattening period varies according to the type of principal feed ingredients used and market demand. Wolayta cattle feeders averagely (±s.d) fed cattle for 3.88±1.18 months with a range of 2-12 months (Table 3). However, if there is enough feed, farmers usually sell fattened cattle earlier. If the animal is not well fattened in one fattening cycle farmers usually extend the feeding period until the animal attains good finishing.

Animals are fattened turn by turn; therefore, new animals are purchased after selling the finished ones. Among the respondents 50.61, 46.95 and 2.44 percent fatten 2, 1 and 3 times per year, respectively. The reported average (±s.d) fattening cycle per year was 1.55±0.55 with a range of 1-3 (Table 3).

According to focus group discussants and key informants number of cattle finished per cycle varies based on capital stand, feed availability and market demand. The reported number of fattening cattle per individual feeder per fattening cycle was 1, 2, 3 and 4 for 75, 23.2, 1.2 and 0.6 percent of the respondents, respectively. The reported number of animals finished per cycle was 1.27±0.51

with a range of 1-4 (Table3). Fattening cattle mainly constitute draught oxen as they are usually used for draught work before fattening commence, even though; very few instances of purchasing cattle directly for fattening were reported. Besides draught oxen, sterile females and cows with poor production and reproduction performances are fed for finishing.

Table 3. Reported length of fattening periods (month), and number of fattening cycles per year and fattening animal per cycle.

Category	N	Least square means±s.e		
Length			# Cycles/year	# Animals/cycle
District				
Damot Gale	50	4.03±0.17[a]	1.23±0.08[a]	1.01±0.07[a]
Soddo Zuria	42	3.45±0.18[b]	1.65±0.09[b]	1.10±0.08[a]
Humbo	36	3.20±0.20[c]	1.71±0.10[b]	1.61±0.09[b]
Offa	36	4.19±0.17[a]	1.79±0.09[b]	1.49±0.08[b]
Agro–ecological zone				
Lowland	27	3.28±0.21[a]	1.63±0.10[a]	1.26±0.09[a]
Mid–highland	101	4.04±0.11[b]	1.57±0.05[a]	1.31±0.05[a]
Highland	36	3.84±0.21[ab]	1.58±0.10[a]	1.34±0.09[a]

LS Means with different superscripts show statistically significant differences at $p \leq 0.05$.

Moreover, our results showed that the number of fattening animals per cycle has positive but low correlation (r) with number of fattening cycles per year ($r = 0.29$; $P \leq 0.001$), however it has weak and negative correlation with length of fattening period ($r = -0.069$; $P \geq 0.05$). Length of fattening period has negative and weak correlation with number of fattening cycles per year ($r = -0.142$; $P \geq 0.05$).

Seasonality of cattle fattening

Most of the time cattle fattening starts before the onset of the main rainy season (May to June). Therefore, cattle fattening is a seasonal operation with a peak from June to September (Figure1) and this is governed by seasonality pattern of feed availability and main holidays.

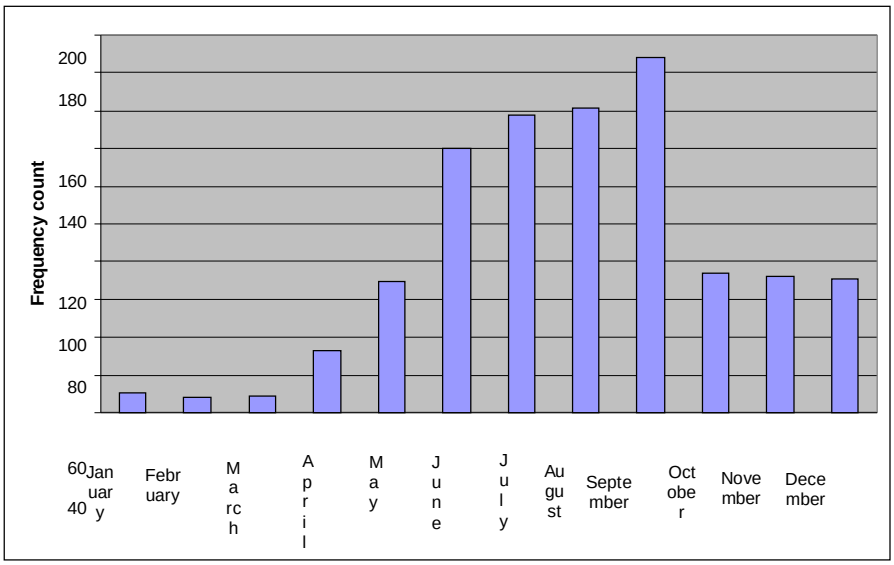

Fig.1. Reported months of cattle fattening

Feed resources

Grass is used as basal feed and proportion of supplementary feeds that are used for cattle fattening are described in Table 4.

Table 4. Reported supplementary feed types used for cattle fattening

Feed type	Freq.	%	Feed type	Freq.	%
Grains			Household leftovers		
Green and dry maize	169	19.81	Aitta tukeea	50	5.86
Green and dry haricot bean	92	10.79	Attelab	37	4.34
Green and dry sorghum	43	5.04	Agro–industrial byproducts		
Green teff	27	3.17	Wheat bran	42	4.92
Boiled maize & haricot bean	24	2.81	Noug cake	9	1.06
Green barley	9	1.06	Others		
Green faba bean	8	0.94	Sugarcane	32	3.75
Root and tuber crops			Bamboo leaf	10	1.17
Sweet potato	153	17.94			
Enset	83	9.73			
Pumpkin	60	7.03			
Cassava	5	0.59			

[a] leftover of hot drink made from coffee leaf and spices; [b] leftover of locally made beverages

Feed is sourced both from farm yard and through purchase and from farm yard only for 70.12 and 29.88% of the respondents, respectively. Relative availability of feeds in decreasing order of importance is presented in Table 5. Respondents have also listed available feed types according to decreasing order of their feeding value (Table 5).

Table 5. Reported mean ranks for availability and feeding value of main supplementary feeds that are common for study districts and agro–ecological zones

Feed type	Level of abundance (mean rank)			Feeding value (mean rank)		
Category	Sweet potato	Green maize	Green hari-cot bean	Sweet potato	Green maize	Green hari-cot bean
District						
Damot Gale	1.15	2.05	3.00	2.24	1.13	2.28
Soddo Zuria	2.09	2.22	2.50	2.04	1.61	2.13
Humbo	2.35	1.22	2.35	2.35	1.23	2.56
Offa	2.07	2.39	2.50	1.38	1.78	2.40
Average rank	**1.92**	**1.97**	**2.59**	**2.00**	**1.45**	**2.34**
Agro–ecological zone						
Lowland	2.30	1.55	2.25	2.04	1.26	2.50
Mid–highland	1.77	1.93	2.48	2.11	1.45	2.26
Highland	1.55	2.14	3.00	2.07	1.30	2.38
Average rank	**1.87**	**1.87**	**2.58**	**2.07**	**1.34**	**2.38**

The lowest the mean rank, the most important is the feed type

Reported seasonal trend in feed availability is graphically presented in Figure 2. Accordingly, main rainy season (June to September) and dry season (December to March) were reported as seasons of better feed availability and feed shortage, respectively.

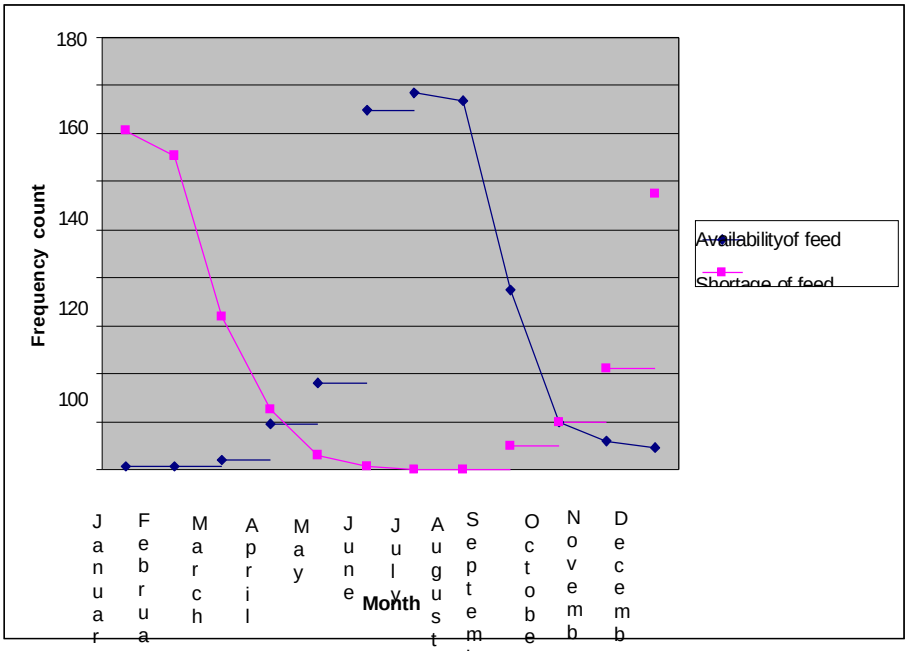

Fig.2. Reported months of feed availability and shortage

Feed scarcity and quality deterioration of the feed during dry season are the main challenges facing smallholder cattle feeders. The main reported combating mechanisms were feed conservation (hay making) and feeding practices including straw and stover feeding, feeding of enset, grain, sweet potato and sugar cane.

Respondents overcome scarcity of water during dry season (December to February) by collecting water from distant areas. During dry season 85.4, 8.2, 2.5, 1.9 and 1.9 percent of the respondents reported that they provide water once a day, twice a day, thrice a day, once in two days and once in three days, respectively. Whereas during wet season 59.0, 26.2, 12.1 and 2.7 percent of the respondents reported that they provide water once a day, once in three days, once in two days and once in four days, respectively. Reported average daily water intake during dry (N=146) and wet (N=141) seasons were 12.52±6.51 and 5.21±3.42 with a range of 2.50 to 30.00 and 0.57 to 12.50 liters, respectively. It was also noted that as the fattening period advanced water intake of the animal would reduce. Moreover, all the respondents fed the natural mineral

lick called "*adua*" by purchasing from local market. Average amount of *adua* daily offered to finishing cattle was reported at 493.42±40.19g with a range of 250 to 500g (N=114). It was also reported that *adua* is used to improve the feed intake of the animal and it is fed to make the beef tasty.

Feeding systems

To minimize fattening costs large proportion of the total feed intake at the start of the fattening period constitutes grass. Whereas as fattening period advances since the animals tend to show more preference for grains, root and tuber crops and household leftovers, it was noted that amount of grass offered gradually decrease. Moreover, it was reported that feed intake is reduced as the quality of feed offered gets poorer and as the finishing period advances. Therefore, to improve the palatability of roughage feeds, treatments like chopping and wilting, soaking within boiled water and *attela* and sprinkling of the mixture of *adua, aitta tukee* and salt are used, and grains are boiled before feeding. Farmers usually start feeding their cattle while they are on draught work. This condition put the animal in better condition when transferred to finishing. Fattening of cattle usually coincides with seasons of better feed availability. Usually farmer have a close look at their animals to provide fattening cattle with feeds on alternative basis according to preference of the animal.

It was found out that locally made materials like wooden bath and clay dish, and synthetic materials such as plastic bath and plastic pot are used as feeding and watering troughs by 74.33, 4.95, 18.02 and 2.70 percent of the respondents, respectively. Farmers mostly provide warm drinks (water and *aitta tukee*) to the animal by assuming that hot drinks can create a warm condition which enables the animal to finish earlier in better condition.

Housing systems

Fattening cattle are kept in a stall constructed as compartment of farmers' house (Table 6). Almost throughout the fattening period stall–fed cattle are enclosed in the stall in order to minimize energy loss by walking, with the exception of taking outside to refresh the animal every two weeks. Litter material is frequently changed and manure is frequently collected to keep the animal in a clean condition. Feeder cattle are well protected from adverse weather conditions, predators attack and theft. To keep the stall warm the wall is covered with leaves and grasses. Enough space is provided in the stall to reduce competition for feed among stall–fed cattle. It was reported that keeping fat-

tening animals in calm and comfortable stall improves voluntary feed intake and would result in more gain.

Table 6. Reported reasons for using in house compartment

Reported reason	Freq	%	Reported reason	Freq	%
It is our culture	71	42.52	Scarcity of resources	23	13.77
To create warm condition	26	15.57	For close supervision	22	13.17
Theft problem	25	14.97			

The routine husbandry practices

Routine husbandry practices are shared among family members and rarely with partner (Table 7). To use manure for crop production, farmers frequently remove cattle faeces and urine and feed refusals from the stall.

Table 7. The routine husbandry practices

Activities	N	Respnsible family membe			r (%)
		Husband	Wife	Children	Partner
Cleaning of the stall	223	15.24	49.78	34.98	0.00
Marketing	175	92.00	2.29	3.42	2.29
Health care	218	71.10	26.61	2.29	0.00
Supplementary feed provision	315	47.94	28.25	23.81	0.00

Discussions

Consistent with FAO (2007) report, selection of fattening cattle for desirable size, conformation and body condition rely upon visual assessment. Besides the health condition of the animal is considered in the selection process, this is because, if the animal is healthy, as it was described by Auriol (1974) mortality and morbidity rates will be kept at lower level.

The length of fattening period for stall-fed cattle exhibits considerable variation. For example, Wardle (1979) reported 3 to 6 months and UNDP (2003) extended to 8 month whereas Nkhonjera *et al*. (1988) reported average of 188±53 days and 213±54 days in Blantyre and Lilongwe areas of Malawi, respectively. According to Habtemariam (2000) farmers in east Ethiopia fed oxen for more than one year, which exceeds the maximum length of fattening period reported in Wolayta. This indicates that, poor performing cattle are kept for a longer period to reach targeted fattening level (Jepsen and Creek, 1976).

Cattle fattening by smallholder farmers in Wolayta is strategically synchronized with seasonal feed availability and main holidays. Inconsistent to our findings cattle are, however, fattened throughout the year with a peak during dry season in Malawi (Agyemang *et al*., 1988). However, in Ethiopia dry season is typically characterized by shortage of feed (Nega *et al*., 2002; Ameha *et al*., 2007). Therefore, animals which fed well during better season of feed availability would gain more (Nkhonjera *et al*., 1988). Moreover, finished cattle are sold at attractive price due to maximum consumption of beef during main holidays (Belachew, 2004; Ebrahim *et al*., 2004). Therefore, supply, demand and consumption of beef exhibit a seasonal trend (Ebrahim *et al*., 2004).

Consistent to John (1987) cut green grass constitutes the bulk of the feed for stall-fed cattle in Wolayta. Maize grain was reported as feed of best feeding value and this might be due to maize starch which is known to be incompletely fermented in the rumen, therefore, likely pass with some degree into the duodenum (Ferreiro *et al*., 1977). However, the use of scarce resources like grain for cattle fattening is rarely practiced in developing countries (Richardson and Smith, 2006). Sweet potato is one of most widely cultivated crops and available feed in Wolayta. As it was described by Backer *et al*. (1980) after harvesting a large volume of forage consisting of stems and leaves and variable amount of non-commercial tuber is left, which can be fed to finishing cattle. It was also reported that sweet potato is the second valuable feed and this might be due to its high starch content (Lu and Sheng, 1990).

Similar to reports of John (1987) and Sanderine (2004) household leftovers such as *attela* and *aitta tukee* are fed to finishing cattle. The former is a traditional brewery and liquor residue, which contains high level of crude protein (20%) and organic matter (97%) (Yoseph *et al*., 2000) and it is a commonly used feed supplement in Ethiopia; whereas the later was prepared from green leaves of coffee boiled together with spices such as ginger, red pepper, garlic and salt as flavors. Similarly, leftover of *chemo*, a comparable type of hot drink used for human consumption is fed to cattle in southwest Ethiopia (Takele, 2005). Moreover, *Adua*, which is used as natural mineral lick supplement in Wolayta cattle fattening is comparable to *natron* (a hydrated sodium carbonate) reported by John (1987) for cattle fattening in Cameron and is rich for its sodium content (Adugna and Said, 1992).

Native pasture is characterized by having remarkable seasonal variation in quantity and quality (Ameha *et al*., 2007). During wet season, feed is more diversified whereas during dry season the feed resource mainly constitutes *en-*

set and cereal straws and stovers. Therefore, consistent to the reports of John (1987) and Marion (2000) purchase of conserved fodder and cut grass from the low-lying relatively wet areas increasingly becomes a common practice (Marion, 2000). However, there is variation in feed types among agro-ecolog-ical zones. For example, farmers in the highland have feed sources like *enset*, which is available year round. Especially, *gefetino* (a matured black-stemmed *enset*) is appreciated by the farmers for its feeding value and a similar type of finding was reported by Marion (2000). However, there are more open communal grazing areas in the lowlands (Marion, 2000).

A farmer group identified high losses in the delivery of feed in cattle finishing systems as a major constraint (CIAT, 2004). Our findings also indicated that adult family members are mainly involved in provision of supplementary feeds to minimize wastage of feed. Our study also showed that large proportion of labor input was provided by adult family members because cattle finishing practice requires care to ensure success (Fourie *et al*., 2006). However, children are also a valuable source of labor especially for cleaning of stall and for provision of supplementary feeds. Cleaning of the stall was largely done by the wife and children and the stall was frequently cleaned to create favorable condition.

In line with the report of Marion (2000), stall-fed cattle are kept in confinement for the entire finishing period. The stall is constructed as a compartment of farmer house (Marion, 2000) from locally available materials and a comparable type of housing system was reported by Nkhonjera *et al*. (1988). This confinement keeps the energy expenditure due to effect of walking at lower levels compared to grazing animals (Schlecht *et al*., 1999; Richardson and Smith, 2006). Farmers reported that the stall is constructed to provide comfortable condition for finishing animal and routine husbandry practices and a comparable reason was reported by Tesfaye *et al*. (2005). Proper housing minimizes stressful environmental conditions (Pusillo *et al*., 1990) as housing conditions are determinants of animal behavior and health (Jan Hultgren, 2001). Inconsistent with the findings of (Muhamad *et al*., 1983; Koknaroglu *et al*., 2000; 2005), the study communities reported that darkened stall covered with leaves and grasses would enable the animal to finish in better condition and gives a glossy coat.

Conclusions

Our studies indicate that the adopted management practices by smallholder traditional cattle feeders are useful to draw important lessons to adopt a com-

parable practice with some modifications elsewhere. Moreover, use of readily available local resources including non-conventional feed sources could be an attractive option for low-income rural poor farmers. Our results showed that the use of locally available feed is a growing practice in Wolayta, however, further work is needed to develop a cost effective feeding strategy, and a ration formulation for finishing cattle.

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