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Avocado Production and Marketing in Southwestern Ethiopia

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Abstract: This study was initiated with the objective of describing the existing avocado production and marketing system, assesses its economic role in the society and point out problems and potentials in the system. Formal and informal surveys were employed to collect the data and descriptive statistics, Net benefit and margin analysis were employed to analyze the data. According to the result, farmers plant avocado either as a sole by using 7×7 m spacing or intercrop with coffee and other fruits. The average amount of fruit bearing trees in an individual farm is 8.11 with an average harvest of 195 kg tree⁻¹ and this made farmers get an average income of 2111.58 birr from the sale of avocado in one production season. Avocado is channeled from producers to wholesalers, retailers, local collectors and cafeterias. From all these market participants, Wholesalers get the largest gross margin (35.41%) from the final consumers' price. Production is challenged by vegetative growth after fruit bearing stage, longetivity, Pest attack, disease and absence of improved management practices. Hence research work on disease and pest and generation of improved management practices are very crucial to avoid such production pitfalls.

Key words: Avocado, avocado production, avocado marketing, market channel, market margin

INTRODUCTION

Avocado is cultivated in tropical and sub-tropical regions from 40° N and 40° S. It is unique among fruit trees in that it is neither sweet nor acidic but of bland nature with a remarkably high nutritional density. It contains 15-30% oil, similar in composition to olive oil, eleven vitamins (vit A, B6, B12, K, C, E, Folacin, Niacin etc...) and fourteen minerals. The calorific value is exceptionally high, 123-387 gmcal/100 g edible avocado and has low sugar content. Avocados are eaten in fresh, Salads with lemon juice salt etc. Avocado is a complete food in terms of protein containing nine essential amino acids although not in proportion. It can almost substitute butter and meat and is called in many countries as poor mans butter. Further it has several uses; as a natural cosmetic, with advantage in rapid skin penetration and as a superior natural sunscreen (Bose and Mitra, 1996). In skin care, the two major advantages of the avocado are its marked softening and soothing nature and its notable absorption. Compared with almond, corn, olive and soybean oils, avocado oil had the highest skin penetration rate (Swisher, 1988). Eating avocado has also been shown to be fully compatible with good weight control. This insight was expressed years ago by Wood (1983) in a book hailed by one health magazine as the finest method for weight reduction known to them. Wood emphasized playful exercise, but his introduction begins: The solution to our

national overweight problem is to encourage people to eat more. He counseled eating fresh plant food heartily. And his recommended list of ingredients for a healthy diet included the avocado. Furthermore, a 40% reduction in stroke risk was associated with an average daily increase in potassium consumption of about 400 mg, the amount supplied by less than half an avocado (Smith *et al.*, 1983).

Avocado market, driven by global retail players, will continue to grow steadily. The production will reach 4.7 MTon in 2012. The estimate of the global avocado market in 2012 is about \$7.5 bln in retail prices. The top avocado producers are Mexico, Indonesia and U.S. with Chile steadily approaching to key player position. Growing demand of the domestic market will force U.S. avocado growers to abandon completely avocado exports in favor of local retailers. Leading exporters are Mexico and Chile with Israel facing hard competition on European markets from Spain and South Africa (Market Research Analyst, 2008).

Private orchard owners in Hirna and wondo-Genet first introduced Avocado to Ethiopia in 1938. Gradually, its cultivation spread nation-wide with satisfactory adoption to different agro-ecologies. Most wet parts of Ethiopia provide favorable weather condition for avocado cultivation (Etissa, 1999).

Despite the favorable weather condition, Avocado was unknown to both producers and consumers in southwestern Ethiopia before two decades. In 1979, a collection orchard was established by planting few collections. When these trees started bearing, more seeds were planted to promote genetic recombination. That was how utilization of avocado fruits started in Jima Metu, Gera, Tepi and Bebeke area. Presently there is a great demand for avocado in Southwestern Ethiopia (Etissa, 1999). Its introduction and dissemination has contributed a lot in income generation and employment creation to the farming society. It has also become greater source of income for traders, private business institutions, governmental and non-governmental organizations. As a result, the production and area coverage of this fruit has now moved from nearly nothing to a significant level. The annual report of Jima Beuro of Agriculture (2000) indicated that avocado has now occupied 75% of fruit farmland in the area. In line with this, Jimma Agricultural Research Center (JARC) has taken responsibility to introduce and disseminate Avocado seedlings to farmers dwell in and around the vicinity of Jimma zone. According to the report of seed multiplication and center development section of Jima research center, 283,000 seed and seedlings of avocado have been multiplied and distributed to farmers and other stakeholders in and around the vicinity of Jima zone (Jima Agricultural Research Centre, 2004).

Hence, in order to understand and explain such agricultural transformation, it is vital to know the extent of diffusion, channel of diffusion and the reason for the rapid dissemination of this horticultural crop. However, no study has been made in the past to deal with such basic information. To this end, this study helps to give baseline information about the extent and mechanism of diffusion and point out problems and potentials associated with the dissemination of avocado.

The objectives of study were:

- To examine the production, marketing and consumption of avocado in Southwestern Ethiopia
- To explain problems and potentials associated with the production and marketing of avocado
- To investigate its importance in the socioeconomic life of the community

MATERIALS AND METHODS

Area Description

This study was conducted starting from September 2005 up to September 2006 in the four major avocado growing weredas (districts) of Jima and Illubabor Zone of South western Ethiopia. These are Mana, Goma, Seka and Metu. The following map shows the two zones of southwestern Ethiopia where the four major selected avocado growing districts are located.

- Mana is one of the 180 weredas (districts) of oromia region of Ethiopia. Mana is bordered on the south by Seka Chekorsa, on the west by Goma, on the north by Limu Kosa and on the east by Kersa. Based on the figure published by Central Statistical Agency in 2005, this woreda has an estimated total population of 160,096, of whom 80,481 are men and 79,615 are women; 5,471 or 3.42% of its population are urban dwellers, which is less than the Zone average of 12.3%. With an estimated area of 478.91 square kilometers, Mana has an estimated population density of 334.3 people per square kilometer, which is greater than the Zone average of 150.6
- Goma is one of the 13 weredas in Jima zone known for predominantly Growing coffee. It is located 390 km south west of Addis Ababa and about 50 km west of the Jima Zone capital (Jima). There are 36 peasant associations and 3 towns' associations The number of agricultural households in the woreda is 45,567 (35,533 male headed and 10,034 female headed), while the total population of the woreda was 247,326 in 2006/07. Goma is the second most densely populated woreda in the zone with a size of 93,657.72 ha, excluding the state coffee farms. The two farms, Goma I and Goma II, have a total area of 2704 ha. Hence the total area of the woreda is 96,361.72 ha (96.4 km²)
- Seka is one of the 180 weredas of oromia region of Ethiopia. The altitude of this woreda ranges from 1580 to 2560 m above sea level; perennial rivers include the Abono, Anja, Gulufa and Meti. A survey of the land in this woreda shows that 45.3% is arable or cultivable 44.9% was under annual crops, 6.1% pasture, 25.8% forest and the remaining 22.8% is considered swampy, degraded or otherwise unusable
- Metu is one of the 180 weredas of oromia region of Ethiopia. Metu is bordered on the south by Ale, on the southwest by Bure, on the west by the west wellega, on the north by Darimu, on the northeast by Supena Sodo, and on the east by Yayu. This woreda has an estimated total population of 154,927, of whom 77,565 are men and 77,362 are women; 38,217 or 24.67% of its population are urban dwellers, which is greater than the Zone average of 12%. With an estimated area of 1,461.41 square kilometers, Metu has an estimated population density of 106 people per square kilometer, which is greater than the Zone average of 72.3

The Data

Both primary and secondary types of data have been used to write this report. More specifically, data on the level of production, consumption, value of sale (income), costs of production and marketing of avocado at the producers, assemblers and wholesalers level have been collected and utilized to produce this report.

Method of Data Collection

Exploratory/informal survey was first conducted to have a better insight and identify the major area of concern. PRA tools such as Group discussion, observations and

semi-structured interview of key informants have been employed as tools for generating information during this survey.

The subsequent survey (formal survey) was then undertaken by using multi stage purposive sampling. That is, based on volume of production and marketing; two zones, namely Jima and Illuababora have been selected. Three weredas/districts from Jima and one wereda/district from Illuababora zone were then selected. A further selection of two PAs from each wereda/district was also made by considering the same criteria which were used to select the zones and weredas/districts. Finally 30 avocado producing households were selected from each PAs as samples and were interviewed by using a structured questionnaire. This sample size was assumed to be representative due to the fact that it has been taken from a relatively small size of household population. In addition samples taken by using purposive sampling are said to be more representative even if the sample size is kept small as compared with random sampling.

Secondary information was also collected through extensive formal and informal interaction with wereda agricultural beauro and Jima Agricultural Research Centre.

Method of Data Analysis

Descriptive statistics such as mean and frequencies were used to characterize the existing avocado production and marketing in the areas. Net benefit analysis has also been employed to investigate the socioeconomic importance of this crop among the producers and other market participants in the market chain. Furthermore margin analysis was used to calculate the profit margin that each market participant takes from the total consumers' price

RESULTS AND DISCUSSION

This survey has been conducted in the four major Avocado growing weredas of Jimma and Illubabor zone. Namely Metu, Goma, Mana and Seka. More than 100 farmers have been purposively interviewed about avocado production and marketing in these weredas using a structured questionnaire. The result showed that avocado is playing a pivotal role in the socioeconomic life of the farmers by giving a yield up to 1200 kg per tree. The statistics also depicted that the average maximum and minimum value of sale of avocado by an individual farmers in a year is 2951.42 and 1271.74 birr, respectively and the average consumption level per household was found to be 22% of the total production in one production season. Detailed analysis of the demographic and socioeconomic characteristics of avocado growing farmers together with the production and marketing system are presented below.

Demographic and Socioeconomic Characteristics

The demographic and socioeconomic characteristics of avocado growing farmers in each wereda are presented in the Table 1.

The result from Table 1 indicates that the age of avocado growing farmers (45.85 years in Metu, 46.33 years in Goma, 52.14 years in Mana and 42.45 years in Seka) and their farming experience (21.21 years in metu, 23.96 in Goma, 28.86 in Mana and 22.17 in Seka) are similar in all the surveyed weredas showing that this economically important fruit is largely produced by elder farmers and hence this calls for the need to popularize and disseminate avocado for young farmers with minimum years of farming experience.

With regard to land ownership, Table 1 shows that there is almost a similar size of land holding by the sampled farmers, the average ranging from 2.18 to 2.78 ha in the four surveyed wereda of Jimma and Illubabor zone.

Table 1: Demographic and socioeconomic characteristics of avocado growing farmers

Characteristic	Metu			Goma			Mana			Seka		
	N	Mean	SD	N	Mean	SD	N	Mean	SD	N	Mean	SD
Age of household head	27	45.85	15.49	24	46.33	13.54	22	52.14	9.89	31	42.45	14.58
Experience in farming	28	21.21	13.49	24	23.96	11.98	22	28.86	10.34	29	22.17	12.79
Total land holding	24	2.78	1.36	21	2.74	2.26	20	2.46	1.49	30	2.18	1.30

Characteristic	Metu			Goma			Mana			Seka		
	N	Freq	%	N	Freq	%	N	Freq	%	N	Freq	%
Educational level	27			23			22			29		
1. illiterate		7	25.9		3	13.0		13	59.1		10	34.5
2. Elementary		14	51.9		11	47.8		7	31.8		12	41.4
3. Junior		2	7.9		2	8.7		1	4.5		1	3.4
4. High school		4	14.8		7	30.4		1	4.5		6	20.6
Religion	28			24			22			31		
1. Orthodox		12	42.9		9	37.5		6	27.3		6	19.9
2. Muslim		14	50.0		14	58.3		16	72.7		25	80.6
3. Protestant		1	3.6		1	4.2		-	-		-	-
4. Catholic		1	3.6		-	-		-	-		-	-
Occupation other than farming	23			22			22			29		
1. hand craft		-	-		2	9.1		1	4.3		1	3.4
2. trade		2	8.7		5	22.7		1	4.3		5	17.2
3. No other occupation		15	65.2		9	40.9		17	77.7		21	72.4
4. government employ		6	26.1		6	23.3		3	13.6		2	6.9

Survey result 2005/2006

Table 1 also shows that 51.9, 47.8 and 41.4% of farmers have attended elementary education in Metu, Goma and Seka wereda respectively and this has contributed for the adoption of avocado production in the farming system. The statistics also show that most of avocado growers are farmers with no other occupation. Hence those farmers with other off-farm activities have to be encouraged to produce this economical viable horticultural crop. The larger percentage of native (Muslims) farmers producing avocado especially in Mana (72.6%) and Seka (80.6%) in Table 1 also calls for intensive work on popularization and dissemination of Avocado for settlers (Christians).

Dissemination of Avocado

Avocado was not known in southwestern part of the country before two decades. But the effort made by Jima agricultural Research centre in multiplying and distributing avocado seed/seedling brought a significant change in the production and use of avocado in the area. Even if there were farmers who planted avocado at the beginning of 1980s, most of them reported that they started to plant avocado in the late 80's. Wereda beauro of Agriculture and NGOs were the main channels to popularize and disseminate avocado from Jima Agricultural research centre to the farmers. The survey result showed that Jima Agricultural research centre by itself and through beauro of Agriculture and NGOs was the pioneer organization to introduce and disseminate avocado planting material to the area. According to the information obtained from wereda beauro of agriculture, the total acreage of land covered by avocado in Mana and Seka wereda during the survey year is 443.5 and 257 ha, respectively.

According to the result in Table 2, JARC by itself has disseminated avocado seed/seedling to 50, 27.3, 25 and 7.1% of the sampled households in Seka, Mana, Goma and Metu, respectively. Furthermore, Beuro of Agriculture and NGOs were used as channel by JARC to disseminate avocado as it is shown in Table 2. The large proportion of dissemination of avocado seed/seedling through NGOs in Metu (28.6%) and Goma wereda (20.8%) as compared with the other two weredas was due to the existence of Menschen fur Menschen

Table 2: Farmers response on their initial source of seed/seedling for avocado production

Characteristics	Metu		Goma		Mana		Seka	
	N = 28	% of farmers responses	N = 24	% of farmers responses	N = 22	% of farmers responses	N = 32	% of farmers responses
Source of planting material								
JARC by itself		7.1		25.0		27.3		50.0
JARC through BOA		46.4		8.3		27.3		43.8
JARC through NGO		28.6		20.8		13.6		-
Relatives /neighbor		14.3		16.7		18.2		3.1
Other		3.6		29.2		13.6		3.1

Survey result 2005/2006

and the ex-Norwegians in the two weredas, respectively. The large proportion of avocado seed/seedling dissemination by the JARC itself in Seka was attributed to the relative nearness of the research centre to farmers in the area. This suggests that the research and extension wing of the centre should extend its dissemination and popularization activities even to a distant places so as to avoid the loss of benefit that could have been obtained from the production and sale of this fruit by those interested farmers when the intermediary NGOs become non-functional in the area. The same result was obtained by a study on status of avocado production in Kenya by Wasilwa *et al.* (2004) and his group in 2004. According to this study, Kenya Agricultural Research Institute played a pionner role in the introduction and dissemination of avocado planting materials. The same type of study made on avocado production in Thailand by Babpraserth and Subhadrabanhu (2000) revealed that Pak Chong Research station and the Royal project foundation are the two main sources of avocado seed/seedlings to farmers.

In addition to the effort of Jima Agricultural research centre, Markets (purchase from individuals) and cafeterias also took part in the dissemination of seed/seedlings of avocado.

Production

Objective of Production

The result from Table 3 proved that the main objective of Avocado production by the majority of the farmers (71.4% in Metu, 66.7% in Goma, 81.8% in Mana and 59.4% in Seka) is for sale whereas a small proportion of the sampled households (17.9% in Metu, 12.5% in Goma, 9.1% in Mana 12.5% in Seka) reported that their motive of avocado production is for consumption. However a significant number of sampled households in Goma (20.8%) and Seka (28.1%) also reported that they produce avocado for both sale and consumption.

Current Source and Type of Planting Material of Avocado

It is known that the nature of planting material largely influence the production and productivity of a given crop. The following table illustrates the type and use of planting material of avocado in the four surveyed weredas.

According to the result obtained in Table 4, the majority of the farmers in Metu (53.6%) and Goma (70.8%) reported that they use seedlings as a planting material whereas the majority of farmers in Mana area (52.4%) reported that the use seed as their planting material for avocado. However the majority of the farmers in Seka wereda (40.6%) use both seed and seedlings as a planting material. A similar result was also obtained by a study made on avocado production in Veitnam by Chau and Truyen (1999). The study revealed that seedlings were the major and most popular planting materials used by avocado producers like that of avocado producers in Metu and Goma area of Southwestern Ethiopia. Even if Jima Agricultural Research Centre was the first to introduce the planting materials, most of the

Table 3: Objective of production

Characteristics	Metu		Goma		Mana		Seka	
	N	% of farmers	N	% of farmers	N	% of farmers	N	% of farmers
		responses		responses		responses		responses
Objective of production	28		24		22		32	
1. Sale		71.4		66.7		81.8		59.4
2. Consumption		17.9		12.5		9.1		12.5
3.Both sale and consumption		10.7		20.8		9.1		28.1

Survey result 2005/2006

Table 4: Type of planting materials currently used and farmers' selection criteria

Characteristics	Metu		Goma		Mana		Seka	
	N	% of farmers	N	% of farmers	N	% of farmers	N	% of farmers
		responses		responses		responses		responses
Type of planting material	28	28.0	24	24.0	22	22.0	32	32.0
1. Seed		28.6		25.0		52.4		31.3
2. Seedling		53.6		70.8		47.6		28.1
3. Both		17.9		4.2		-		40.6
Type of seed as planting material		28.0		24.0		22.0		32.0
1. Seed fallen on the ground		6.3		21.1		9.5		7.7
2. Seed collected from the tree		81.3		57.9		61.9		88.5
3. Both		12.0		21.1		28.6		3.8
Criteria to select the seed		28.0		24.0		22.0		32.0
1. Color		13.3		11.1		9.5		4.0
2. Size		66.7		77.8		90.5		72.0
3. Taste		20.0		11.1		-		4.0
4. Size and color		-		-		-		12.0
5. No selection		-		-		-		8.0

Survey result, 2005/2006

avocado growing farmers reported that they currently use their own planting material from their avocado tree. The result in Table 4 also shows that the majority of the farmers (81.3% in Metu, 57.9% in Goma, 61.9% in Mana and 88.5% in Seka) use seeds collected from the tree as a planting material rather than seeds fallen on the ground. It was also found out that size is the major factor that farmers consider in selecting the seed for their planting material as it was confirmed by 66.7, 77.8, 90.5 and 72% of the household respondents in Metu, Goma, Mana and Seka wereda respectively in Table 4. Hence research has to consider size in developing variety for avocado.

Number of Avocado Trees Currently Owned and Output Produced

A number of Avocado seed/seedling can be planted by farmers to get more output. But their survival rate can be affected by a number of factors. Hence what matters is not the number planted but number of tree that are productive (fruit bearing trees) in the farmers field.

According to the survey result, the average number of fruit bearing avocado trees owned by individual farmers is 8.11. A study made on the status of avocado production in Kenya by Wasilwa et al., 2004 indicated that the number of mature and fruit bearing avocado trees owned by a producer ranges between 11 and 33. This large difference in the number of matured fruit bearing trees as compared with avocado producers in southwestern Ethiopia is largely attributed to the leading position of Kenya in exporting Avocado to the EU market which is largely produced by smallholder farmers. The following table illustrates the current status of avocado tree population by the overall sampled farmers.

According to the result shown in the Table 5, the average no of trees owned by individual farmers is 37.05. Out of this, the average no of avocado trees died at juvelline and

Table 5: No of avocado trees owned by farmers

Characteristic	N	Mean	Minimum	Maximum
Total No. of avocado tree owned	104	37.05	1	302
No. of avocado died at juvenile stage	102	4.75	0	40
No. of avocado died at maturity	99	2.13	0	93
No. of avocado tree bearing fruit	95	8.11	0	100

Survey result 2005/2006

Table 6: Avocado production at the time of good harvest

Characteristic	N	Mean	Minimum	Maximum
No. of bearing fruit trees (8.11)	95			8.11
- Amount harvested per tree (in kg)	96	1200.00	15.00	269.78
- Total amount produced in kg		9732.00	121.65	2187.92
Minus				
% of consumption in one production season (22.189%)	88	2159.43	26.99	485.48 kg
- Net amount for sale in kg		6997.41	87.46	1702.44

Calculated from survey result, 2005/2006

maturity stage is 4.75 and 2.13, respectively. The death of tree at the earlier stage was largely attributed to shortage of water and exposure to excess amount of sun light where as the cause for death at maturity was avocado disease .But the avocado farmers do not have any idea about the disease as a cause for the death of their tree. Most of them said that the tree first dries and then dies. Therefore, in addition to the effort of generating disease resistant varieties as a sustainable solution, some attempts should be made to create awareness about the symptoms, causes and provisional preventive measures of the disease. A larger discrepancy is also observed between the total number of trees owned (37.05) and number of productive trees (8.11) in an individual farm and the major reason for this gap was mentioned to be vegetative growth. Most of the farmers reported that their avocado tree exhibit only vegetative growth at and even after its fruit bearing stage. So avocado research has to find out a sustainable strategies that can avoid or minimize this problem in the farmers' field.

According to the result in Table 6, by taking an average consumption level of 22.19%, the maximum amount that individual farmers provide for market at the time of good harvest is 6997.41 kg or 93.3 quintal (1 quintal = 75 kg) and the average amount for sale by a single farmer is 1702.44 kg or 22.7 quintal (1quintal = 75 kg). However this figure is completely different when there is poor harvest of avocado by farmers. The following table illustrates the production level at the time of poor harvest.

The result from the Table 7 shows that at the time of poor harvest, the maximum amount that an individual farmer produce for sale is 3341.7 kg or 44.5Q (1Q = 75 kg) and the average amount for sale is 808.44 kg or 10.78 Q (1Q = 75 kg). Here the same average percentage for consumption is used for both production levels because the same consumption level was observed in both production levels across all the surveyed weredas. Even if the same level of consumption (22.18% of the total production) number of fruit bearing trees (8.11/farm) were assumed to prevail at both good and poor harvest time, a significant variation was observed in the net amount of sale by farmers in the two harvesting seasons. This was mainly attributed to the difference in yield/tree at the time of good (269.78 kg/tree) and poor harvest (120.96 kg/tree). This yield/tree figure by avocado producers in Southwestern Ethiopia is larger as compared with yield/tree in Philippines and Thailand. According to a study made by Sotto, 2002 on avocado production in Philippines in 2002, the average yield of avocado was found to be 84 kg/tree. The same type of study made in Thailand in 2000 by Babpraserth and Subhandrabandhu 2000 depicted that the yield/tree of avocado ranges between 40.5 and 179 kg. The increased yield per tree by the Ethiopian Farmers may be associated with the type of varieties used and soil nutrient content.

Table 7: Avocado production at the time of poor harvest by an individual farmer

Characteristic	N	Maximum	Minimum	Mean
No. of fruit bearing trees	95			8.11
Amount harvested per tree (kg)	82	500.00	10.00	120.96
Total amount harvested (kg)		4294.65	85.79	1038.97
Minus				
% of consumption (22.189 % of the total harvest)	88	952.94	19.04	230.53
Net amount of sale (kg)		3341.71	66.75	808.44

Calculated from survey result, 2005/2006

Table 8: Productions disaggregated by area at the time of good harvest

Characteristic	Metu				Goma				Mana				Seka			
	N	Max	Min	Mean	N	Max	Min	Mean	N	Max	Min	Mean	N	Max	Min	Mean
No. of fruit bearing tree	23			10.86	22			3.54	21			5.81	29			11.1
Amount of production per tree (kg)	20	400	5	171.7	23	600	20	138	22	800	20	295	31	1200	100	413
Total amount produced in kg minus		4344	54	1865		2127	71	489		4648	116	1714		13,236	1103	4554
% of consumption	17	18.76	18.7	18.76	20	38.7	38.7	38.7	21	17.5	17.5	17.5	30	16.9	16.9	16.9
Net amount for sale in kg		3529	44	1515		1304	44	300		3834	96	1414		11065	922	3807

Calculated from survey result 2005/2006

Table 9: Production disaggregated by area at the time of poor harvest

Characteristic	Metu				Goma				Mana				Seka			
	N	Max	Min	Mean	N	Max	Min	Mean	N	Max	Min	Mean	N	Max	Min	Mean
No. of fruit bearing trees	23			10.86	22			3.54	21			5.81	29			11.03
Amount produced per tree in kg Minus	15	200	10	93.27	17	200	10	59.4	20	500	10	147	30	400	10	152.3
% of consumption	15	18.7	18.7	18.76		38.7	38.7	38.7		17.5	17.5	17.5		16.4	16.4	16.40
Net amount for sale in kg		1764	88	823		436	22	129		2397	48.1	705		3688	92	1404

Calculated from survey result, 2005/2006

One should also expect that there could be a variation in the amount of production among the surveyed weredas. Hence in order to understand the difference and clarify the production level in the specific surveyed weredas, it is better to see the production disaggregated by area.

Table 8 shows that the average production for sale by an individual farmer at the time of good harvest is larger in seka (3807 kg or 51 Q, 1 Q = 75 kg) followed by Metu (1515 kg or 20 Q, 1 Q = 75 kg). These larger average production figures in the two weredas as compared with the rest of the surveyed weredas is mainly attributed to the nearness of those farmers to Jimma and Metu Agricultural research center which in turn made them to have a better access to the seedling and understand earlier about the benefit of producing Avocado.

According to the result in Table 9, the large proportion of amount provided for sale by an individual producer even at the time of poor harvest comes from Metu (823 kg) and Seka wereda (1404 kg). This is mainly due to the existence of a large number of fruit bearing trees in the area as compared with the other two weredas and this in turn can be attributed to the nearness of Metu and Jima Agricultural Research Centre which provide the necessary technical advice and trainings to avocado producing farmers in the area.

Production Pattern

Farmers' production pattern is largely influenced by their available physical resource, economic return they expect and consumption need. When we come to Avocado, 61.9% of the respondent across all the surveyed weredas reported that they intercrop avocado with coffee, enset, maize, taro, ginger, chat, cabbage and banana where as 32.4% of them reported that they solely plant this horticultural crop. Intercropping of avocado with annual crops is made only at its early stage. The rest 5.7% of them reported that they use both sole and

intercropping. Shortage of land and the need to get more benefit from different enterprises were the reasons for intercropping avocado with other crops. Similar information was generated from a study on avocado production in Vietnam in 1999 by N.Minch Chau and V.Truyen which indicated that avocado is intercropped with coffee and other fruits to be used as a shadier.

Management Practice

All farmers in the surveyed wereda reported that there is no improved management practice for avocado in the area. Only a few numbers of farmers reported that they use spacing technology (7×7 m) and recommended hole width size (60×60 cm) in planting avocado. Studies made by different scholars on avocado production revealed that different size of spacing are used by producers in planting their avocado tree. Foreexample, a study made on Avocado production in Peru by Hofshi (2003) indicated that farmers use 4×3 m spacing for planting avocado. That is, there is a greater density of avocado here as compared with the Ethiopian farmers in Southwestern part of the country. This difference in spacing may be associated with the difference in size and expansion nature of the varieties used. But the rest of activities starting from seed multiplication up to harvesting are done by farmers' indigenous practice. That is they prepare the land for seedling raising, add manure and plant the seed. After the seed grows to a certain stage, they put it in a plastic tube which is filled with soil and manure. Then they dig a hole, plant it, water it and weed it until it grows. Some farmers also add compost which is made of ash, animal waste and other by products around the tree after a certain stage of growth in the fields so as to increase yield and prevent it from death due to shortage of food or disease. Farmers also put grinded branch of banana trees around avocado tree expecting that the liquid from the branch will add moisture to the tree. Hence, besides multiplying and distributing seed/seedling, research should strongly focus on generating and introducing improved management (agronomic) practice that can enrich farmers' indigenous knowledge so as to augment production and productivity.

Disease

Avocado disease caused by a fungus called phytophthora, is one of the challenges in avocado production. Its symptoms (drying and rejuvenate again) are not still known by the farmers but are being observed in a number of avocado trees in the farmers' field. Especially the case of one avocado farm in fisho kebele, Seka wereda in which almost all avocado trees (more than 50) are destroyed shows the severity and the great tendency of the distribution of the disease to the area.

A similar problem of disease has been reported as a major challenging factor in the production of Avocado in different studies made on avocado production by different scholars in Kenya, Philipines and Thailand.

Production Constraints

The major production problem that need intervention according to farmers response are:

- **Vegetative growth:** Most of the farmers reported that their avocado trees show only vegetative growth rather than giving yield at their fruit bearing stage
- Falling down of fruits before they are matured
- **Pest problem:** The pest looks like a fly, white in color and attacks the stem. This problem is largely observed in Metu area
- There are no improved agronomic practices introduced in the area

- Disease (drying at the tip and branches)
- **Longevity:** Farmers are very much disappointed by the longer time avocado takes to bear fruit
- There are no extension activities undertaken on avocado in the surveyed areas

Production Potentials

- Better source of cash
- Requires little or no input
- Harvested when there is no harvest of other crops (May-October). So it doesn't compete for labor with other crops
- Serves as shade and prevent erosion
- Has great nutritional value

Marketing

In order to understand the marketing system, it is better first to identify the marketing channels through which the sale is made. According to the investigation made, avocado is channeled from producer to local collectors, cafeteria and wholesales in jimma and finally to Addis Ababa market. Figure 1 shows the marketing chain.

From the above chain, the largest volume of transaction is channeled from producers to wholesalers in Jima and then to wholesalers in Addis Ababa. About 42% of the total transaction is form producers to wholesaler in Jimma and finally to Addis Ababa and cafeteria in jimma. 21.7% of the transaction is from producer to local collector and then to wholesaler in Jimma and Addis Ababa. The remaining 18.5 and 8.7% of the total transaction is from producer to cafeteria and retailer respectively and then to consumer in the respective area. Direct sale by producer to cafeteria is most common in Metu area whereas the chain from producers to local collector and then to wholesalers is common in other area. After identify the chain, it is now better to investigate the conduct and performance of the market in each chain

Producers' Market

Ninety two percent of the interviewed farmers reported that they have sold avocado at least once in their farming life time. Of this, 63% of them reported that they sell their product at the farm gate where as 26.1% them sell to the nearby town market. Wholesalers followed by local collector and cafeteria are the major and most preferred purchasers of avocado by

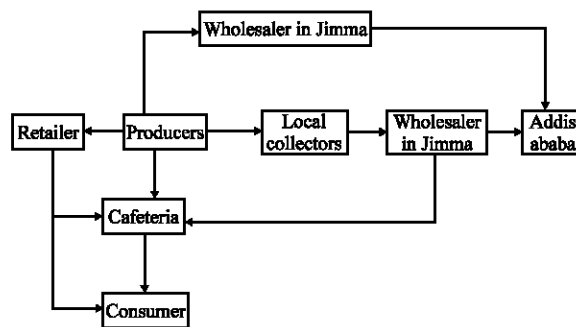


Fig. 1: Marketing chain of avocado in southwestern Ethiopia

the farmer. Better price (44.4%) better scale (27.8%) and secured market (20%) are the major reasons for farmers' preference of buyers. More than 85% of the sale is made in bulk on cash basis and 6.5% of the sale is on credit. Advance sale is also practiced by a very small number of farmers (4.3% of the total transaction) in which farmers take money in advance from traders and promise to provide the output when it is ready for sale. The result also showed that 47.8% of the farmers set their selling price on the basis of the existing demand and supply whereas 46.7% of them relies on the benevolence of their buyers to set their selling price. Only 3.3% of the farmers reported quality as the factor that can influence the selling price. Similar information was also obtained on the producers market from the study made on avocado production in Philippines in 2002 by Sotto (2002). According to the result of his investigation, middlemen, locally called 'comprador' buys all the avocado fruits from the farmers at a lower price and sells them in the market at a higher price. The middlemen generally dictate the farm-gate price since he bears the transportation cost. However the same type of study made in Thailand in 2000 by Babpraserth and Subhadrabandhu 2000 revealed a different result in that the supplier of the planting materials (The Royal project foundation) purchase avocado from the farmers and sell them to Hotels and Supermarket. Even if such differences were observed in the supply chain of Avocado among the Ethiopian, Philippines and Thailand producers' market, all the cases clearly depicted that farmers have a low bargaining power to sell their product at a better scale and price. The average value of sale of avocado by an individual farmer in all surveyed weredas at the time of good and poor harvest is 2951.42 and 1271.74 br, respectively. However it is better to see these figures with respect to each weredas since there is variation in the production level among the surveyed area and is illustrated below.

Note

In the Table 10, production cost is assumed to be negligibly because, there is no fertilizer used and amount of labor required is very minimal. Cost of acquiring seed/seedling is also neglected b/c it is only for the first time that farmer acquires the planting material through purchase. Thereafter, their avocado tree is their major source of planting material.

As can be seen in Table 10, the average amount of additional income that individual farmers could get from the sale of avocado in one production season at the time of good harvest is 6776.4br in Seka, 2290.68br in Mana, 452.4br in Goma and 2286.14br in Metu.

The average net value of sale of avocado by an individual farmer at the time of poor harvest as can be seen in Table 11 is 2504.74 br in Seka, 1141.68 br in Mana 194.53 br in Goma and 1246.02 br in Metu.

Even if the average price level in the four surveyed weredas is almost similar (1.6 br kg⁻¹), the difference in the production level brought the difference in the additional income from the sale of avocado by farmer in the four surveyed weredas. The lower additional income by a farmer from avocado in Goma wereda at the time of good (452.4 br, in Table 10) and poor harvest (194.53 br, in Table 11) may be attributed to the employment of great amount of resource and time to another cash generating crop, coffee. The larger value of sale of avocado by an individual farmer in Seka wereda at the time of good (6776.46 br, in Table 10) and poor harvest (2504.74 br, in Table 11) was mainly due to larger production and this in turn was associated with the nearness of the farmers to technical information and planting material source, Jima Agricultural Research Centre.

Assemblers' Market

Assembles are those people who purchase farmers product in the nearby village market and sell to the wholesalers. In the case of avocado, assemblers (local collectors) purchase

Table 10: Value of sale of avocado at the time of good harvest by individual farmer

Characteristics	Metu			Goma			Mana			Seka		
	Max	Min	Mean	Max	Min	Mean	Max	Min	Mean	Max	Min	Mean
Amount of sale(kg)	3262	44	1510	1304	44	300	3828	96	1414	11065	922	3807
Price(average) Br/kg	1.611	1.611	1.611	1.618	1.618	1.618	1.6694	1.6694	1.6694	1.904	1.904	1.904
Total value of sale in br	5266.36	70.088	2432.61	2109.87	71.192	485.4	6392.76	160.32	2361.38	21023.5	1751.8	7233.3
-Total Marketing cost (transporting) in br	317.1	4.27	146.47	143.44	4.84	33	191.4	4.8	70.7	1327.8	110.64	456.84
-Total Production cost in br	-	-	-	-	-	-	-	-	-	-	-	-
Net sale (Benefit) in br	4949.26	66.64	2286.14	1966.43	66.35	452.4	6201.36	155.52	2290.98	19695.7	1641.16	6776.46

Calculated from survey result 2005/2006

Table 11: Value of sale of avocado at the time of poor harvest by individual farmer

Characteristics	Metu			Goma			Mana			Seka		
	Max	Min	Mean	Max	Min	Mean	Max	Min	Mean	Max	Min	Mean
Amount of sale (in kg)	1764	88	823	434	22	129	2397	48.1	705	3688	92	1404
Price in br/kg	1.611	1.611	1.611	1.618	1.618	1.618	1.6694	1.6694	1.6694	1.904	1.904	1.904
Total value of sale in br	2841.8	141.77	1325.85	702.2	35.6	208.72	4001.55	80.30	1176.93	7021.95	175.17	2673.22
-Total marketing cost (transportation) in br	171.12	8.54	79.83	47.74	2.42	14.19	119.85	2.41	35.25	442.56	11.04	168.48
-Total production cost in br	-	-	-	-	-	-	-	-	-	-	-	-
Net benefit	2670.68	133.23	1246.02	654.46	33.2	194.53	3881.7	77.89	1141.68	6579.39	164.13	2504.74

Calculated from survey result 2005/2006, Production and input costs are assumed to be negligible as in Table 10

from farmers with an average price 1.6 bir per kg and sell to the wholesaler in Jimma with a price ranging from 1 birr/kg to 5.50 birr kg⁻¹. Assemblers are important to the farmers in that farmers do not go larger distance and incur large amount of transportation costs to sell their output. Usually they purchase from farmers with the price set by themselves and sell by the price agreed b/n them and wholesalers.

Wholesalers Market

According to the information obtained, wholesalers in Jima purchase avocado from Metu, Hurumu Yayu, jimma agricultural research center, Sokoru, Saja and Shebe. They purchase mainly from farmers and local collectors. 40-50 ISUZU of avocado (200,000-250,000 kg) are purchased by each of the wholesalers when there is good harvest during Hamle Nehassie and Meskerem. The minimum amount of purchase by each of the wholesalers is 3-4 ISUZU (15,000-20,000 kg) at the time of poor harvest. This minimum amount of purchase occurs when avocado dries and aborts. When there is a good yield, wholesalers purchase this product with a price of 0.75 cents kg⁻¹ and the price level will go up to 5.50 birr kg⁻¹ when there is minimum production due to drying and abortion Hence change in supply is the major factor that influence wholesalers' price in the area. That is wholesalers purchase price is largely based on market forces (demand and supply) and terms of purchase is usually made on cash basis.

After purchase, the wholesalers in Jimma transport and sell their avocado to wholesales in Addis Ababa and Nazereth. A maximum of 40-50 ISUZU (200,000-250,000 kg) and minimum of 3-5 ISUZU (15,000-25,000 kg) of avocado is sold to the Addis Ababa market by the individual wholesaler with a price ranging between 3.50-7 birr kg⁻¹ in one production season (Hamle to Meskerem). Again the selling price of the wholesaler in Jimma to Addis Ababa market is largely set by the existing demand and supply condition and the transaction is also made on cash basis. The benefit that the wholesaler in Jimma can get from the sale of avocado to Addis Ababa is presented below.

As can be seen from Table 12, the maximum net benefit that a single avocado wholesaler could get from the sale of avocado at the time of good harvest can extend up to 331,600birr in one production season.

Table 12: Maximum value of sale by a wholesaler at the time of good harvest

Amount of sale → 50 ISUZU →	2500Q →
1 ISUZU = 50Q and 1Q = 100 kg	250,000kg
Selling price in br/kg	5.25birr/kg
Gross value of sale	1,312,500birr
Minus	
Value of purchase → 250,000 kg x 3.125 br/kg	781,250 birr
Cost of packing material (2500Q x 2.50 birr/Q) →	6,250 birr
Cost of labor for packing (1 birr/Quintal x2500Q) →	2500 birr
Loading (1 birr/Quintal x 2500Q) →	2,500 birr
Unloading (1 birr/Quintal x 2500Q) →	2,500 birr
Transportation	
From purchase source to Jima (1000/isuzu x50isuzu)	
From Jima to Addis Ababa(1100/isuzu x 50isuzu)	55,000birr+50,000birr=105,000 birr
Cost for brokers in purchase (500br/ISUZU x 50 ISUZU)	
Cost of brokers in sale (0.20 br/kg x 250,000 kg)	25,000 birr+50,000 birr = 75,000 birr
Loss due to damage (2Q = 200 kg x 3.125 br/kg)	625 birr
Loss of weight due to loss of moisture (2Q = 200 kg x 3.125 br/kg)	625 birr
Ware house rent → 150 br/month x12→	1800 birr/year
Inland revenue →	1600 birr/year
Tax (0.50 cents/Quintal x 2500Q) →	1250 birr
Total cost	980,900 br
Maximum Net benefit →(Gross sale-Total cost)	331,600 bir
Calculated from survey result 2005/2006	

Table 13: Minimum value of sale by a wholesaler at the time of poor harvest

Amount of sale → 3 ISUZU → 150Q →	15,000 kg
1 Isuzu = 50 Q , 1Q = 100 kg	
Selling price →	5.25 birr/kg
Total sale →	78,750 bir
Minus → value of purchase (15,000 kg x 3.125 br/kg) →	46,875 br
Cost of packing material → 150Q x 2.50 →	375 br
Cost of labor for packing (1br/Q x 150Q)→	150 bir
Loading (1 bir/Quintal x 150 Q) →	150 bir
Unloading (1 bir/Quintal x 150 Q) →	150 bir
Transportation	
from purchase place to Jima(1000 br/isuzu x3isuzu)	3000
From Jimma to terminal market (1100 br/isuzu x3isuz	3300
Cost of brokers (for purchase) →500bir/ISUZUx3	1500 bir
Cost of brokers (for sale) → 0.20 cents/kg x 15,000 kkg→	3000 bir
Loss due to damage (2Q = 200 kg x 3.25 br/kg) →	625 bir
Weight loss due to moisture loss (2Q=200kg x 3.255bir/kg)	625 br
Ware house rent 150bir/month → 150 br x 12	1800 bir/year
Inland revenues	1600 bir/year
Tax (0.50 cents/Quintal) → 0.50 bir x 150 Q	75 bir
Total cost	63,225
Minimum Net benefit (Gross sale-Total cost)	15,525 bir
Calculated from survey result 2005/2006	

According to the result in Table 13, the average net benefit that a single avocado wholesaler could get at the time of poor harvest can go down up to 15,525 birr in a single production season.

The average net benefit that an individual wholesaler in jima can get from the sale of avocado to Addis Ababa in one production season is 173562.50 birr (331,600 birr + 15,525 birr = 347125 birr/2).

Cafeteria Market

A total of 5 cafeterias in selected area of jima town which sell avocado juice were interviewed using a structured questionnaire since they are the major route through which avocado is channeled to consumers. According to the information obtained most of the cafeterias purchase avocado from wholesaler and retailers because these two sources are

easily accessible to the cafeterias. But farmers are the most preferred source of supply by the cafeterias due to their low price as compared with the traders. Most of the cafeterias reported that they purchase avocado when they finish what they have on hand. But weekly purchase is practiced by the majority of the cafeterias. The maximum and minimum amount of weekly purchase by the cafeteria is 400 and 60 kg, respectively depending on the level of consumption of avocado juice by consumers. The higher purchase price is 3 birr kg⁻¹ during winter time and the lower purchase price is 1.50 birr/kg and is usually during the summer time. From the surveyed result, it was also found out that from 1 kg of avocado, an average of 2 glass of avocado juice can be obtained. When there is greater demand, an average of 87 glass of avocado juice is sold by an individual cafeteria and 48 glass of avocado juice (average) is sold in a day when there is less demand with a price of 2.50 birr glass⁻¹ of juice. That means an average of 43.5 and 24 kg of avocado is daily consumed by individual cafeterias when there is larger and lower demand respectively. An individual cafeteria can also get an average amount of 218 br daily from the sale of avocado juice when there is good demand and 120 bir (average) when there is low demand. The overall result shows that avocado juice has the highest market demand as compared with the other fruit juices. Pineapple and mango juices took the second and third places respectively to be preferred and consumed by consumers.

Marketing Margins

Before calculating marketing margins, it is important to know some misunderstanding about the concept of marketing margin:

- Even though exchange activity adds ownership benefit to product and also generate income for sellers all this income is not pure profit. In fact big marketing margins may result in little or no profit, or a loss for the seller involved. That depends on the marketing costs as well as in the selling and buying price
- Marketing margins are not always earned only by middlemen. In Agricultural marketing farmers receive part of the marketing margin as producers per se. To the extent that they also perform marketing activities (e.g., rural assembly, transport) they also earn an additional share of the total marketing margin

Marketing Margins of Participants in the Main Avocado Marketing Chain Market Chain Participants Average Selling Price of Avocado (br kg⁻¹)

Producers	1.6 birr kg ⁻¹
Assemblers	3.125 birr kg ⁻¹
Wholesaler in Jimma	5.25 birr kg ⁻¹
Wholesaler in Addis	6.00 birr kg ⁻¹
Consumer in Addis	6.00 birr kg ⁻¹

$$\text{Gross marketing margin of assemblers} = \frac{3.125 - 1.6 \text{ birr}}{6 \text{ birr}} \times 100 = 25.4\%$$

$$\text{Gross marketing margin of wholesalers in Jimma} = \frac{5.25 - 3.125 \text{ birr}}{6.00 \text{ birr}} \times 100 = 35.41\%$$

$$\text{Gross marketing margin of wholesaler in Addis} = \frac{6.00 - 5.2 \text{ birr}}{6.00 \text{ birr}} \times 100 = 12.5\%$$

$$\begin{aligned}\text{Total gross marketing margin} &= \text{GMM}_A + \text{GMM}_{WA} + \text{GMM}_{WJ} = 25.4 + 12.5 + 35.41 \\ &= 73.3\%\end{aligned}$$

$$\begin{aligned}\text{Gross marketing margin of producers} &= 100\% - \text{total Gross marketing margin} \\ &= 100 - 73.3\%\end{aligned}$$

$$\text{Gross marketing margin of producers} = 26.7\%$$

According to the margin calculated, 35.41% of the gross profit from the transaction is taken by the wholesalers in Jimma, 25.4% by assemblers 26.7% by the producers and the remaining 12.5% of the gross profit is taken by the wholesalers in Addis.

Marketing Problems

Marketing is a process that links production to consumption. Therefore problems in the marketing system affect both the production and consumption system. According to the investigation made, most of the farmers reported that there is low demand and they get low price for their product and have low bargaining power to influence their price due to their poor economy and perishable nature of the product. Especially the problem of marketing by farmers is most common in Metu area. Farmers themselves carry their avocado to sell to cafeterias where they may not get better scale and price.

CONCLUSIONS

Even if avocado was not known before two decades in southwestern Ethiopia, its greater dissemination and production by the leading effort of Jimma agricultural research center has currently brought a positive and significant change in the socioeconomic life of those who are actively involved in the production and marketing of this crop. It was found out that avocado was generating an average additional income of 2416 birr in Metu, 480 birr in Goma, 2262.4 birr in Mana and 6091.2 birr in Seka, for an individual farmer with no production and little marketing costs. It is also benefiting those wholesalers selling from Jimma to Addis Ababa by generating an average additional income of 165,187 birr individually in a given production season.

Even though avocado is contributing much for the livelihood of the society in the area, its production is confronted by a number of different challenges. Vegetative growth (ceasing to give yield), falling down of fruit before maturity, pests which attack the stem, fungal disease caused by phytophthora and absence of improved management practice are the major obstacles that are faced by the beneficiaries of avocado production.

Therefore, there should be efforts to minimize and finally eradicate these problems in order to sustain the benefit that can be obtained from the production and sale of avocado.

RECOMMENDATION

Production

- Farmers don't even know about the symptoms of the disease. Therefore the work on awareness creation has to be started and strengthened
- Research has to strongly work on an avocado disease and at least has to come up with temporary prevention measures until the final solution is forwarded

- Research work on agronomic aspects has to be started soon to boost production and productivity
- Research on avocado pest has to be started soon since pests are now becoming challenges just like that of the disease especially in Metu area
- Research also has to work on developing varieties that can give output within a relatively short period of time

Marketing

- Just like coffee producers in the area, farmers should establish their own marketing cooperative so as to increase their bargaining power in setting their price for avocado

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