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Research Article

Evaluation of physical Facilities, Operation and Management Practice in Selective Public Abattoirs in Eastern Oromia, Ethiopia

Abstract

The natures of public abattoirs have a tendency for small market and information on these abattoirs is very limited. This study was conducted with the objectives to assess physical condition, functional infrastructure, daily data record, operational of the abattoirs and analysis the perception of abattoirs works on beef quality determinants at Adama, Dire Dawa and Haramaya University. To know the perception of abattoirs workers on beef quality and operational system survey and discussion was conducted on abattoir works (57) respondents and personal observation. The survey result and personal observation indicated that not all the abattoirs were working to their full potential. Adama, Dire Dawa and Haramaya University abattoirs were established for domestic consumption service. The facilities in abattoir were very few. There were no training for workers related to section hence, operated in traditional ways. No regular health condition check for abattoir workers. In all abattoirs, there were no veterinary laboratory, refrigerator, functional stunning pen, and chilling room, by product collection room, sterilization facilities, hot water service and hazard analytical critical control point (HACCP). Lack of the required instrumentation and facilities in the abattoirs, less attention from the administration and few types of research were carried out on meat quality and abattoir functionality management in all studied abattoirs. There were only limited information was recorded daily. In all abattoirs, there were no carcass classification system on practice, and no breed and age record practices too. Hygiene and sanitation were largerly absent in all abattoirs. Abattoir workers ranked lairage, bleeding methods and carcass handling as important factors to determine meat quality, respectively. Accessing periodically health treatment and train about the section for abattoir worker, updating facilities and peculiarly record all action in abattoir to generate more information for stakeholders.

Introduction

Proper handling of animal is not only matter of welfare but it's also a matter of meat quality and improper handling of animal products resulted poor meat quality (Yonela and Voster, 2017). Meat is one of the most nutritious foods that humans can consume, particularly in terms of supplying high-quality protein (essential amino acids), minerals (Iron) and essential vitamins with strong implications in health, economy, and culture worldwide. However, most animal products including meat are highly perishable due to bacterial load and handling methods [1,2]. An abattoir is defined a place of registered by the controlling authority for hygienic slaughtering, inspection of animals and processing meat product for human consumption [3]. A standard abattoir should have qualified personnel, state of the arts equipment, lairage, adequate and portable water supply, good drainage and efficient sanitation system. In its nature animal source food is easily contaminate. The increasing demand meat is not only quantity wise but also quality wise. The main actors that contribute for meat quality are producers, traders, cooperatives, abattoirs, butchers, processors, and consumers in Ethiopian [4]. However, there was less communication between actors. Therefore, the slaughter animals were exposed to different conditions during production and transportation to abattoirs on a daily basis (Yonela and Voster, 2017).

Quality of meat is associated with stress. In the abattoir (lairage) animals need enough time to recovery from transportation stress and other management practices pre slaughters [5]. Improper pre-slaughter handling during transport was resulted in undesirable pH with PSE and DFD meat [6], poor water-holding capacity and end up in poor cooking loss. The DFD meat has a high ultimate pH, which expose meat for high microbial contamination [7]. Improper bleeding affects

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the quality of meat. Abnormal physicomechanical properties of meat limit consumer acceptance of the product; hence it is important to evaluate meat to see consumer's acceptance. However, in most developing countries standard asnd hygienic methods of handling and processing meat are given less attention even though in part/form of the country's rules and regulations on animal meat production and process [8].

Different abattoirs had vary in size and sophistication depending on location and local government ordinance; but it should contain the following facilities or have them nearby: Lairage, Isolation block, Slaughter Hall, Cooling Hall, Hide and Skin Store, Guttery and Tripery, Offices, Condemned meat room or apartment, Laboratory and Lavatory, dressing accommodation with lockers, laundry [9]. Similarly in Ethiopia different abattoirs has different management and facilities, particularly between private and municipality abattoirs [10]. Conversely, the Ethiopian standard prepared under the direction of Agricultural and Food Technology Technical Committee and published by the quality and Standard Authority of Ethiopian (QSAE). The different standard and their perspective requirement for meat industries are Ethiopian standard (ES) 1109:2005: Mutton and Goat meat curried and canned –specification, ES1110:2005:- Chilled and frozen mutton and goat meat- specification, ES 1111:2005:- Chilled and Frozen Beef- Specification, ES 1118: 2005:- abattoir basic requirements. However, application of this regulation was not under practical especially in municipality abattoir in Ethiopia. However, some application was observed in private abattoirs. This indicated that different abattoirs had different management and operational practiced due to not periodically monitoring and evaluation from higher administrative office at federal, regional and fewer researches were design on. The study was conducted with the objectives to assess physical condition, functional infrastructure, daily data record, operational of the abattoirs and analysis the perception of abattoirs workers on beef quality determinants at Adama, Dire Dawa and Haramaya University.

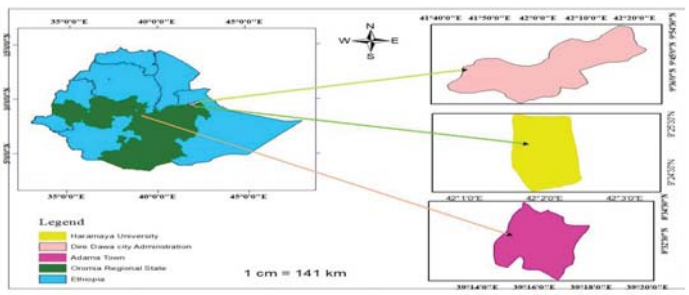

Figure 1: Map of study area.
Source: Own computation from GIS data, 2018.

Materials and Methods

Description of the study areas

The study was conducted in two selected municipality of Adama and Dire Dawa and Haramaya University community service abattoirs. Geographically both cities and Haramaya University are located in the Eastern part of Oromia from the capital city Finfinnee (Addis Ababa). Brief description and physical location of the study area was shown in table 1 and figure 1 respectively.

Adama and Dire Dawa municipality abattoirs are medium size which can slaughtered about 200-300 animals per day. Haramaya University community service abattoir is small size abattoir, which can used for 30-50 animal slaughter per days. All abattoirs were established/ gives the service of slaughtering cattle, goat, and sheep. Additionally, Dire Dawa municipality abattoir was given the camel slaughter service. However, any abattoirs were not gives poultry slaughtering service.

Survey data collection

Data and information were collected through interviews and questionnaires. The information was gathered using random sampling techniques from abattoirs worker. The sim-structured questionnaires were prepared to generate data on perception abattoir workers. Information on demographic characteristic of abattoirs workers, labor division, capacity building and treatment incentive in each abattoirs, daily data records, operational procedures and perceptions of abattoirs workers on meat quality determinants were collected. To generate information from abattoir works about 21 from Adama, 21 from Dire Dawa municipality Abattoir and 15 from Haramaya University community service abattoir were asked. From three abattoirs a total of 57 abattoirs workers were interviewed and personal observations was conducted. In addition to interviewed abattoirs workers personal observation was conducted during practiced slaughtering activates and all document abattoirs were assessed particularly regarding data records and others. The survey data were collected between the mid of September to the beginning of December 2017 for this study. However, the observation was also conducted at next season wet at June 2017 if any difference management and operation might be change.

Methods of statistical analysis

The collected data were entered into Statistical Package for Social Science Software (SPSS) version 20 and analyzed though descriptive analysis such as percentage, mean and standard deviation were used to explain the different sociodemographic

Table 1: Brief description of three study areas.

Location	Service provided	City/ location	Administration	Dis.from Finfine	Location	Altitude (m.a.s.l)	T (°C)	RF (mm)
Dire Dawa	Local meat consumption	Dire Dawa	Dire Dawa	520 East	9°35'35"N 41°51'58"E	1200	22.5	626
Adama	Local meat consumption	Adama	Oromia	90 East	8°33' 00"N 39°16'00"E	1627	20.5	808
HU	Local meat consumption	HU	Oromia	510 East	9° 25'30"N 42° 2' 0"E	1980	16	780

Source. *Google Earth, 2017, m.* a.s.l. = meter above sea level; RF=Rain fall; HU= Haramaya University, T= Temperature.

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characteristics and other data collected by interview from respondents. The qualitative data and personal observation were analyzed through description, explanation, and narration.

Five Likert [11], rating scale was employed to analyze the perception of abattoir works on beef quality determinants. The Likert scale of 1 to 5 points is used to measure respondents' perception on beef quality determinants for positive items, strongly disagreed awarded 1 point, disagreed 2 points, neutral 3 points, agreed 4 points and strongly agreed 5 points. On the other hand, the reverse values were assigned for negative items. To create a Likert scale perception index five Likert items employed to develop a composite perception index and the items filled each respondent.

Then the mean scores for all the factors ranked by arranging in descending order. The Likert scale of 1 to 5 points with a mean score of three [2], was used as a cut-off point to measure respondents' perception. The mean score of three and above was used to denote agree while a mean score below three was used to denote disagree for positive items while the reverse decision was given on the contrary for the negative items. Chi-square test was used for one categorical dependent and two or more levels category of independent variables. It was employed to see if there were significant mean and proportion differences between categories in terms of different explanatory variables.

Results and Discussion

Demographic characteristics of abattoir workers

Demographic characteristics of abattoir workers are presented in table 2. Most of the abattoir workers (91.12%) were male and in the active productive age group (mean 31.69±8.8 year). A similar report by Simon *et al.* at Kenya Bura district showed that men in active age production group participate on slaughter sources. The slaughters work activities were conducted during the night at Adama and Dire Dawa municipal abattoirs while at Haramaya community service abattoir it conducted during daytime. The educational level of abattoir workers in the category of literate (95.26%) in all abattoirs covered with the current study. The majority of workers were in high school and primary school level. This is a good opportunity to adopt technologies in respect to abattoir operation, especially for changing the manual instrumentations to automatic. Their average work experience of people involved in the service was greater than 4 years; however, the training related section was not responded.

Labor division, capacity building and health care for abattoir worker

Work division, capacity building and health care of abattoir workers are presented in table 3. Carcass splitters, loading and unloading, meat inspection, supervision and facilitation, and clearance of head, skin, and leg were responsibility shared by different individual. In almost abattoirs, training related to specific section was not provided (64.91%). Personal in Dire Dawa abattoir were more trained than others personals in abattoir studied. This might be due to work experience of Dire Dawa municipality abattoir workers greater than others (Table 3). Abattoir workers in the current study had no regular health checkup. Without regular checkup for health, it is difficult to ensure food safety of the animal products. This less intensive for regular check up and training is due to the higher sectors was not administered by professional/academic. At Adama and Dire Dawa towns' abattoir were directed by municipality administration than livestock office. Similarly, in Haramaya university community service the abattoir is directed by enterprise without collaboration with school of animal and range science and veterinary collage. Cortosi [12], strongly recommended that the local authorities should grant a license for abattoir workers to attain the required standard carcass dressing qualification. Similarly [13], recommended regular and periodic training for abattoir workers to maintain sound sanitary, safe meat hygiene, and gear forward the technical operation efficiency. In all study abattoirs to plan on regular training about section and check up for abattoirs workers, the abattoir should be administered by office of livestock resource development agency in collaboration with health office, environmental health and city administration. Similarly, in Haramaya University the enterprise should be work closely with healthy office in campus, school of animal and range science and veterinarians.

Abattoir facilities at adama, dire dawa and haramaya university

Basic facilities available in Adama, Dire Dawa and Haramaya

Table 2: Demographic characteristic of abattoir workers.

Variable	Attribute		Abattoirs N=57						Overall N (%)	X^2
			Adama (21)		Dire Dawa (21)		HU (15)			
			N	%	N	%	N	%		
Sex	Male		19	90.48	21	100	12	80	52 (91.12)	3.98
	Female		2	9.52	0	0	3	20	5(8.77)	
Educational status	Illiterates		0	0	1	4.76	0	0	1(1.75)	6.53
	Primary school		8	38.10	12	57.14	7	46.67	27(46.37)	
	High School		12	57.14	5	23.81	7	46.67	24(42.1)	
	Dip/degree		1	4.76	3	14.29	1	6.66	4(7.1)	
Age (yr)	Mi	Ma	Me ±SD	Mi	Ma	Me±SD	Mi	Ma	Me±SD	
	19	56	30.64±8.6	24	56	34.62±8	21	60	29.8±10	31.69±8.8	48.49
AWE.		32	4.76 ±6.54	1	30	8.3±8.24	3	20	5.86±4.1	6.31 ±6.29	30.1

AWE (yr) =Abattoir work experience on carcass dressing in year, Dip= Diploma, HU= Haramaya University, Ma= maximum, Me= mean, Mi= Minimum, n= Number of respondents, SD= Standard deviation, X^2=Chi-square.

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Table 3: Work division, capacity building and health care of abattoir workers.

Variable	Attribute	Local of Abattoir			Overall (57)	X^2
		Adama(21)	D/D (21)	HU (15)		
		N (%)	N (%)	N (%)		
Responsibility of responders	Carcass split	9(42.86)	12(57.14)	12(80)	33 (57.89)	6.19
	Load and unloading	4(19.05)	3(14.29)	0(0)	7 (12.28)	
	Meat inspector	2(9.52)	3(14.29)	1(6.67)	6 (10.52)	
	Supervisor	2(9.52)	1(4.76	1 (6.67)	4 (7.02)	
	Head, Skin and Leg Cleaner	4(19.05)	3(14.29)	1(6.67)	8 (14.03)	
TSRAW	Trained	3(14.3)	13(61.9)	4(26.67)	20(35.08)	11.09*
	No trained	18(85.7)	8(38.1)	11(73.33)	37(64.91)	
Health check up	Check up regularly	1(4.8)	10(46.6)	1(6.67)	12 (21.05)	16.54**
	Not checkup regularly	20(92.5)	11(52.4)	14(93.33)	45 (78.95)	

* (P<0.05), ** (P<0.01), D/D= Dire Dawa, HU=Haramaya University, TSRAW= Training service related to abattoir work, X^2= Chi-square, n(x) = number in bracket indicates percent.

University abattoirs are presented in table 4. All abattoirs have Lairage, manual hoist, floor and electricity services, and office. Adama municipality abattoir was the only abattoirs, which had different compartment lairage, functional electrical hoist, bleeding section; Evisceration section and slaughter were practiced on hoist. Inefficiency in bleeding out animals at slaughter deteriorates the meat quality [14].

Dire Dawa municipality abattoir and Haramaya University community service abattoir had a manual hoist but, bleeding and flying hide carried out on the floor or all activities (from stunning to transportation processed carcass) were applied on point floor. These are cases for contamination of meat with waste products which are potentially hazardous at the time of slaughter and processing with harmful bacteria, such as *E.coli O157*, *Campylobacter* and *Salmonella* and decrease quality. Current result was supported by Yonel and Voster who reported that the way of animal handled in slaughtered on floor can affect the quality of the end product, however, different abattoir had different facilities [10]. In all studied abattoirs, there were no veterinary laboratory, refrigerator, functional stunning pen, and chilling room, by product collection room, sterilization facilities, hot water service and HACCP. Adequate waste collection, disposal and good drainage should be provided as mandatory for abattoir since most of abattoirs are proximity to resident, however, the waste (effluent) in studied abattoirs were dumped on field and in the drainage runs into the nearest river or stream. Although, very few facilities/equipments are available in respective abattoirs the managing and supervision for facility is low. Like lairage, floor and hall, truck is not regularly clean and applied disinfectants. Olwumi *et al.*, in Lagos State Abattoir and Akpabio *et al.*, [3], in Aba abattoir were reported that many abattoirs dispose of their effluents directly into streams and rivers without any form of treatment in Nigeria.

Table 4: Basic facilities in Adama, Dire Dawa and Haramaya University abattoirs.

Components of abattoir	Public abattoirs		
	Adama	Dire Dawa	Haramaya University
Lairage	Present	Present	Present
Compartments lairage	Present	Not present	Not present
Stunning pen	Not present	Not present	Not present
Slaughter hall and floor	Present	Present	Present
Bleeding section	Present	Not Present	Not present
Evisceration section	Present	Not present	Not present
Deboning room	Present	Present	Present
Chilling room	Not present	Not present	Not present
Room for gut and tripe	Not present	Not present	Not present
Waste collected room	Not present	Not present	Not present
Manual hoist	Present	Present	Present
Electrical hoist	Present	Not Present	Not Present
Drainage system	Not well construct	Not well construct	Not well construct
Office block	Present	Present	Present with farm
Bath room	Not usually	Not usually	Not usually
Hot water	Not present	Not Present	Not present
Electricity	Present	Present	Present
Refrigerator	Not present	Not present	Not present
Veterinary laboratory	Not present	Not present	Not present
Carcass certification	Present	Present	Not present
Van tuck	Present	Present	Not present
Sterilized equipment	Not present	Not present	Not present
Bus service	Present	Present	Not present
HACCP	Not present	Not present	Not present

HACCP = Hazard Analytical Critical Control Point.

Data recording practice in the study abattoirs

Data recording practices in study abattoirs are presented in table 5. The survey result and personal observation indicated that not all the abattoirs were working to their full potential. The reasons behind were lack of the required instrumentation and facilities in the abattoirs, less attention from the administration, and few types of research were carried out on meat quality and abattoir functionality management. The nature of municipal abattoirs is that they tend to serve a very small market and information on these abattoirs is very limited (Yonel and Voster, 2013). In all abattoirs, there were no carcass classification system on practice, and no breed and age record practices too. However the proclamation of the country on the issue of meat inspection No 81/1976 order classification and database management plant for processing livestock product.

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In all abattoirs, ante- and postmortem carcass were inspected on daily basis. The antemortem inspection includes abnormal posture, movement; behavior checking for and pregnancy were inspected once. The decision made on antemortem inspection includes accepting, condemned and detained for days if the animal was seriously emaciated and condemnation if found pregnant. Inspected carcasses were certified by inspector at Dire Dawa and Adama municipality abattoirs. Carcass yield was weighed and recorded in Haramaya University community service abattoir. The condemnation of carcass for specific diseases was reported to the regional agricultural bureau on monthly basis.

Operation and procedures in studied abattoirs

Cattle management in lairage, slaughter floor and carcass transportation are presented in table 6. Adama and Dire Dawa abattoirs were established to give service of slaughter for local butchers and public institutions. The capacity of slaughter cattle in both abattoirs was for 200-300 cattle per day. Haramaya University abattoir is small sized, established only for the community service, slaughtering up to 20 animals per day. Cattle stay more length of time in lairage at Adama abattoir 6-12 hour. FAO [15], specifies the withdrawal of feed 12-24 hours before slaughter.

Table 5: Data recording practices in study abattoirs.

Parameters	Public Abattoirs		
	Adama	Dire Dawa	Haramaya University
Live animal weight	No	No	No
Breed	No	No	No
Age	No	No	No
Sex	Yes	Yes	No
Location	No	No	Yes
Anti-mortem finding	Occasional	Occasional	Occasional
Post-mortem finding	Yes	Yes	Yes
Carcass yield	No	No	Yes
Carcass classification	No	No	No

Table 6: Cattle management in lairage, slaughter floor and carcass transportation.

Variable	Attribute	Local abattoir			Total (57)	x^2
		Adama (21)	D/D (21)	HU (15)	n (%)	
Time in lairage (Hrs.)	< 3	0(0)	0(0)	15(100)	15(26.3)	78.4***
	3-6	1(4.8)	13(61.9)	0(0)	14 (24.6)	
	6-12	19(90.4)	8(38.1)	(0)	27(47.4)	
	12-24	1(4.8)	0(0)	0(0)	1(1.8)	
Stunning methods	Hammer	8(38.1)	1(4.8)	15(100)	24(42.1)	32.78***
	Sharp knife	13(61.9)	20(95.2)	0(00	33(57.9)	
Time of slaughter	During day time	1(4.8)	1(4.8)	15(100)	16(28.1)	52.23***
	During night	20(95.2)	20(95.2)	0(0)	41(71.90)	
Carcass transport	City Vans truck	12(57.1)	21(100)	0(0)	(57.89)	72.55***
	Private ways	942.9)	0(0)	0(0)	9(15.79)	
	HU car	0(0)	0(0)	15(100)	15(26.3)	

n= Number of respondent, D/D= Dire Dawa, HU= Haramaya University, x^2 = Chi-square.

Stunning was practiced in all abattoirs, using either sharp knife or hammer at atlanto-occipital space of cattle. [16,17] reported that stunning methods contribute to animal welfare and affects the quality of meat. Adama and Dire Dawa abattoirs, cattle slaughtered during nighttime from 10:00 PM to 6:00 AM. On the other hand, the Haramaya University community service abattoir conducted slaughtering service regularly in the morning times from 6:00 AM to 7:30 AM. At Adama and Dire Dawa abattoirs slaughtering at regular time for bull and female head of cattle is charged 150 ($5.56) and 130 ($4.81) Ethiopian birr, respectively. According to revealed information from respondents different cost between sexes of cattle is due to flying hide from male is difficult than female cattle addition to have big body size of male cattle. However, it at irregular time different charge was paid up to 500 Ethiopian birr ($18.52) for both sexes. In Haramaya University, since the abattoirs were work only for campus community there was no collected slaughter fee.

Base on survey result and personal observation, quartered hot carcasses delivered to butcher mainly with van truck in Adama and Dire Dawa municipality abattoirs. However, some butchers/restaurants not a member of butchery association, transported carcass with their own vehicle, three-wheel motorcycle (*Bajaj*), and horse-carts (*Gari*) from abattoir to butchers. The current result is similar with [2], who reported that carcasses were not delivered to butcheries with vehicle contain inbuilt refrigerator in Adama and Bishoftu. The Chi-square result indicated that a strongly significant difference among abattoirs at ($P<0.001$) on time cattle stay in lairage, stunning methods, time of slaughter and carcass transportation. This indicated that in different abattoirs there are different operations systems.

Perception of abattoir worker on beef quality determinants

Perception of abattoir workers on beef quality determinants are presented in table 7. In this study abattoir personal were requested on beef quality determinants; length of stay in lairage, bleeding methods, carcass handling, condition of transport, loading and unloading and methods of stunning. Muscle glycogen depletion during handling, transportation at pre-slaughter result to lactic acid production; thus dark, firm and dry meat produced [15], this dark cutting in beef related with the time stay in lairage pre-slaughter [18]. All respondents agree on those beef quality determinant as important factors despite their important ranked differently.

The highest mean score or beef quality determinate for length of time in lairage, followed by methods of bleeding and post- slaughter carcass handling, while the lowest mean score uses methods of stunning and, condition of loading and unloading point. It is important to create awareness on beef quality determinants and that proper handling would be practiced [19-23].

Summary

Ethiopia has large numbers of livestock resource. However, the contribution of livestock and livestock products potential

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Table 7: Perception of abattoir workers on beef quality determinants.

Variable	Mean	SD	Rank	Decision
Length of stay in lairiage	4.07	0.78	1	Agree
Methods of bleeding	3.91	0.85	2	Agree
Post slaughter carcass handling	3.81	1.16	3	Agree
Conditions of trekking/transport	3.68	1.06	4	Agree
Condition of loading and unloading	3.62	1.0	5	Agree
Methods of stunning	3.47	1.01	6	Agree

n=Numbers of respondents, SD= standard deviation.

is underutilized. This study was assessing the faculties, management, and operational practice at public abattoirs in Adama, Dire Dawa and Haramaya University. The study were conducted through personal observation both physical work and record keeping. The survey data was also conducted within 57 respondent's abattoir workers. The survey data were analyzed using statistical package software for social science (SPSS) version 20. The perception of abattoir worker was analyzed through a Likert scale and Garret ranking methods. Most of the abattoir workers were male and in the active productive age group. Regarding educational level of abattoir workers in the category of literate in all abattoirs covered. This is a good opportunity to adopt technologies in respect to abattoir operation, especially for changing the manual instrumentations to automatic. Their average work experience of people involved in the service was greater than 4 years; however, the training related section was not respond. All abattoirs had different facilities. However, in all abattoirs, there were no veterinary laboratory, refrigerator, functional stunning pen, chilling room, by product collection room, sterilization facilities, hot water service and HACCP. Adequate waste collection, disposal and good drainage should be provided as mandatory for abattoir since most of abattoirs are proximity to resident, however, the waste (effluent) in studied abattoirs were dumped on field and in the drainage runs into the nearest river or stream. All the abattoirs were not working to their full potential due to lack of instrumentation and facilities in the abattoirs, less attention from the administration, and few types of research were carried out on meat quality and abattoir functionality management. Haramaya University abattoir was operated at day time; however, Adama and Dire Dawa were at night time. The highest mean score or beef quality determinate for length of time in lairage, followed by methods of bleeding and post- slaughter carcass handling, while the lowest mean score uses methods of stunning and, condition of loading and unloading point.

Conclusion

Facilities, management and operation practice of abattoirs can highly contribute for meat quality. Training and timely health treatment service was rare provided for abattoirs worker hence operated in poor hygienic and traditional system. All abattoirs had no laboratory, refrigerator and stunning pen. No carcass classification conducted. All the abattoirs were not working to their full potential due to lack of instrumentation. However, all abattoirs had different facilities this happened due to management in system of respective abattoirs. Since less coverage of research and timely report for management in all abattoirs there were no more data recorded to generate information about section. Lairage, methods of bleeding and carcass handling were suggested the major meat quality determinants as abattoir.

Based on the conclusion made, it is possible to suggest the following recommendations to improve the quality of beef in Ethiopia.

1. Accessing periodically health treatment and train about the section for abattoir workers.
2. A standard abattoir with the following facilities should be provided by the state Government updating facilities, compartment lairage, stunning pen, evisceration section, bleeding section, Equipments sterilization facilities, veterinary laboratory, refrigerator, chilling room, by product collection room, hide and skin processing room hot water service and established HACCP facilities.
3. Records all daily activities in abattoirs to generate all information for concern bodies.
4. Design research activities related to abattoir activities and impacts of current situation in meat quality and environmental health especially in Haramaya University were huge potentials are available for design research.
5. Creating awareness among traders and butchers on proper handling of cattle and good hygienic practice in an abattoir for quality beef production.

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