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Research Article

Effect of dental age on edible and non-edible meat yield characteristics of indigenous beef cattle

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Abstract

The objective of this study was to know the effect of dental age on the meat yield characteristics of indigenous beef carcasses. This experiment was conducted with five (5) treatments (T_1, T_2, T_3, T_4 and T_5) where T_1 = 0 Permanent incisor, T_2 = 2 Permanent incisors, T_3 = 4 Permanent incisors, T_4 = 6 Permanent incisors, T_5 = 8 Permanent incisors having ten (10) replications. From the experiment it shows that live and hot carcass weight increased significantly in T_1 and T_2 compared to T_3, T_4 and T_5. Cold carcass weight (CCW) increased significantly with the advancement of dental maturity. KPH% was highest in T_4 and lowest in T_3 whereas round and loin% were highest in T_4 and T_3 respectively but both are lowest in T_1. Lungs with trachea, liver and kidney weight% were significantly higher in T_1 than others group. In conclusion, maximum live weight gain and hot carcass weight were achieved in the dental age groups of two to four permanent incisors.

Introduction

Livestock plays a momentous role in Bangladesh's agricultural economy (Kamal et al., 2019; Islam et al., 2022a & 2022b). In Bangladesh, beef cattle production is expanding and helping to meet the nation's growing need for high-protein foods (Sultana at el., 2017).To investigate dental age effect on meat yield characteristics of indigenous beef cattle, it is prerequisite to know slaughter weight, hot carcass weight, dressing percentage etc. Indigenous cattle constitute the most dominant and relatively low efficient meat producer in Bangladesh. They provide the majority of meat consumed locally and contribute considerably to the export trade (e.g., Bengal Meat, personal communication). Economically, beef cattle are evaluated on the basis of dressing percentage that defines the marketable proportion of the animal weight. Preston and Willis (1974) found that dressing percentage increased with the increase of weight and fattening of animal to a certain weight. This weight is intrinsic to breeds and bulls should be slaughtered at it (Mohammed et al., 2007). The shape and dimensions of animal carcass were used to describe carcass fatness (Allen and Kilkenny, 1980). Preston and Willis (1974) added that some measurements of carcass like length, width and depth had been recommended as useful predictors for carcass yield and composition. Indigenous cattle of Bangladesh are raised under conditions of no weighing devices to determine animal body weight. The accuracy of such subjective method depends on individual experience. The importance of conformation as an indicator of commercial value is based on the assumption that carcasses with better conformation have advantages in terms of lean meat yield, proportion of higher priced cuts and possibly greater muscle size or area (Kempster et al., 1986). The ability to identify composition of a beef carcass is a valuable research tool (Hanson et al., 1999). The best practice to estimate yield of cattle is to first break down the whole carcass (Lee et al., 2005). However, prediction equations estimated using carcass traits have been adopted by the beef industry because of their practicability (Murphey et al.,1985; Johnson et al.,1995). It has been well documented that carcass composition varies among cows, bulls, and steers (Mukhoty and Berg, 1971; Miller et al., 1987; Hinks et al., 1999). Douglas et al. (1985) demonstrated that many research trials require accurate determination of beef carcass composition giving emphasize on animal age. Yet, total dissection of a carcass is costly and time consuming. The makeup of each primal is highly related to whole carcass composition. In this study, the round, rib, loin and chuck of the indigenous cattle were physically separated to determine which cut best represents the composition of the entire beef carcass on the basis of dental age variation. The non-carcass parts of beef cattle are a source of food and raw material for industrial use, and are of major significance to beef producers because they influence kill-out proportion and thus carcass weight, on which payment is based (Keane, 1993). The slaughterhouse by-products may be divided into edible such as liver, heart, kidney, thymus, pancreas, spleen, lungs and fat and inedible such as feet, inedible raw bone, horns, hooves, bile, blood and fat but this distinction is not rigid (Aberle et al., 2001; Ali et al., 2013). There are relatively few studies examining the proportions and growth of non-carcass parts or offal. Many research trials require accurate prediction equation for estimates of beef carcass, determination of beef carcass composition (Hanson et al., 1999) and slaughterhouse by-products in connection with the dental age variation. However, there is still a serious lack of information regarding animal age, meat yield characteristics and carcass composition of indigenous cattle. Meanwhile, no research has been conducted to recognize the yield attributes of indigenous beef carcasses nationwide in Bangladesh.

Materials and Methods

Cattle background

Bulls with different dental age were collected from different feedlots over the country. The classification was done by combining teeth maturity of 0, 2, 4, 6 or 8 permanent incisors in animals (Corrêa,1996). Collected bulls were healthy and free from diseases. In order to produce clean carcasses, bull slaughter operators adopted various recommended practices, making use of the latest technology to reduce possible pathogenic contamination. Then the cattle were slaughtered on separate days. Slaughtering operation of cattle was conducted at Mini Slaughter plant, Field Laboratory, Department of Animal Science, Bangladesh Agricultural University, Mymensingh. Cattle were transported to slaughter place mainly by trucks. The unloading was done in a humane manner, so that the cattle were not injured. Typically, the receiving and unloading of cattle was supervised by the researcher himself. Cattle were given rest, be fasted and receive water in the lairage for 24 hours. Before cattle were slaughtered, they were kept for ante-mortem inspection carried out by the Ante-mortem Inspection Unit of the Slaughterhouse Section which was designated by the University authority. Post-mortem inspections were also conducted by health inspectors at the slaughterhouse as soon as the cattle were slaughtered and dressed (Brasil, 1968; Steiner, 1983; Gil and Durao, 1985; Snijders, 1988).

Halal method of slaughtering and bleeding

The cattle were first bled by following Islamic or halal slaughter process. A small incision, 30 cm long, was cut through the neck, reaching through the trachea, esophagus, the jugular veins and carotid arteries, without severing the spinal cord. The vein was cut to drain the blood from the bull. The vein was cut at a 45-degree angle. Bleeding was performed by the sagittal opening of the neck by the middle line and cutting the anterior aorta and anterior vena cava in the beginning of the carotid arteries and at the end of the jugular veins. Care was taken not to cut too deep in the chest direction, as blood may enter the thorax and adhere to the parietal pleura and to the tips of the ribs (Thornton, 1969).

Flaying and dressing

Flaying is tricky and the success of this procedure depends on the efficiency and experience of the employees handling it. Manual flaying procedure was followed. In the manual procedure, sharp knives were used to slowly remove the hide from the underlying flesh. This was followed by brisket opening and head removal. During the head removal, dehorning and ear removal took place. Then evisceration was conducted wherein the viscera were removed and processed. When this has been completed, the carcass is then split down the backbone so that the spinal cord can be removed carefully. The carcass was then washed thoroughly to remove bone dust, blood specks and hair.

Carcass chilling

Approximately two hours after slaughtering the fore and hind quarters were separated between ribs 12 and 13. Then the meat sample of carcass was chilled at 2 to 4 °C for 24 hours.

Determination of weight and other parameters

There is a close relationship between the distance around an animal's heart girth and its body weight. This is a nonlinear relationship expressed by the formula $W = aG^b$ where W is the weight; G is the heart girth; a and b are constants. From repeated measurements of body dimensions and weights, empirical linear formulas have been developed for determining body weight from measurements of heart girth (G) and body length as measured from the point of shoulders to the pin bones (L).
Bennet's formula is most useful for estimating weights of finished steers of the British breeds. The formula is: W=1.04 (27 .5758 × G)-1 049.67) (W in lb and G in inches)
Shaeffer's formula is most useful for zebu cattle within 5% accuracy.
$W = \frac{L \times G^2}{300}$ Pounds. This formula was followed to estimate the live weight of the slaughter cattle.
Hot carcass weight, chilled carcass weight, weight of four primal cuts e.g., round, chuck, loin and rib were determined using weigh balance. The internal carcass fat associated with the kidney, pelvic cavity and heart expressed as a % of chilled carcass weight.
Dressing percentage (DP) was determined using the following formula;

$$\text{Dressing percentage, } DP\% = \frac{\text{chilled carcass weight}}{\text{Liv e weight}} \times 100$$

Statistical model and analysis

Effects of dental age on carcass traits were evaluated separately by using the analysis of variance following a general linear model in Completely Randomized Design (CRD). The Statistical model of CRD is given below: The one-way model is:
$y_{ij} = \mu + \tau_i + \varepsilon_{ij}$ i = 1,...,a; j = 1,...,n
where:
y_{ij} = observation j in group or treatment i
μ = the overall mean
τ_i = the fixed effect of group or treatment i (different dental age groups)
ε_{ij} = random error with mean 0 and variance σ^2
The independent variable τ, often called a factor, represents the effects of different treatments (different dental age groups). The factor influences the values of the dependent variable y.
The statistical analyses were made separately for each yield character. Mean difference was assessed by the Duncan separation procedure. Pearson's correlation coefficient was performed to identify significant carcass traits to predict carcass yield (SAS, 1996).

Results and Discussion

Carcass measurement

Summary statistics for live animal and carcass measures of indigenous beef cattle was showed in (Table 1). It appears that live weight and the hot carcass weight (HCW) were increased gradually with the advancing of age (T_1 and T_2, compared to T_3, T_4 and T_5). Thus, teeth maturity had a significant ($p<0.001$) effect on live weight and hot carcass weight (HCW) among the teeth maturity groups of indigenous cattle, respectively. In this animal trial the average HCW was 68.51 kg, 90.13 kg, 120.48 kg, 134.83 kg and 139.45kgin the teeth maturity group of 0 permanent incisors (pi) (T_1) to eight pi (T_5), respectively. Means of hot and cold dressing percentage were not similar for teeth maturity group, with percent values of 47.71, 49.48, 51.61, 52.84 and 53.12 on hot carcass; and 46.78, 48.51, 50.60, 51.81 and 52.08 on cold carcass weight basis in the teeth maturity group of 0 permanent incisors (pi) (T_1) to eight pi (T_5), respectively. This finding is probably related to the fact that mean slaughter, hot carcass and cold carcass weights were not similar among the different teeth maturity groups. It also appears in the Table 1 that kidney, pelvic, and heart fat, % KPH of the indigenous cattle was 2.45, 3.02, 2.35, 3.36 and 3.11 in the dental age group of 0 permanent incisors (pi) (T_1) to eight pi (T_5), respectively. The result showed that teeth maturity had a significant ($p<0.001$) effect on KPH of the indigenous cattle.

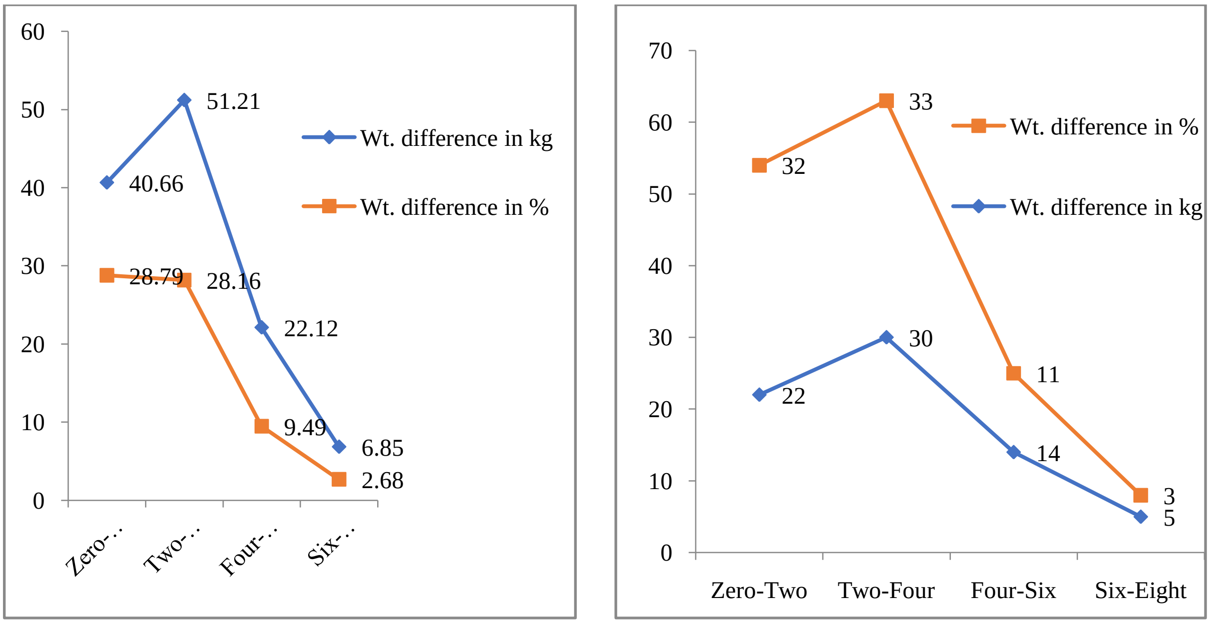
Carcass weight can be an important factor in beef tenderness as heavier carcasses may have a more tender meat than the lighter ones even at the same sarcomere length (Lochner et al., 1980). According to Duarte et al. (2011) who found in their experimental trials that carcasses from animals with eight permanent incisors had a higher average weight (319.99 kg) than those averaging 271.55 kg. In this trial, there was an effect ($p<0.05$) of the dental maturity on the cold carcass weight (CCW). This was due to greater life span that provided greater weight to the group of animals with 8 permanent incisors. Pflanzer et al. (2009) showed that hot carcass weight significantly ($p<0.05$) increased with the advancing of dental age. He showed that the average of all carcasses was 271.9 kg, ranging from 228.0 kg to 313.4 kg with age group of 2 pi to 6 pi, respectively which is well matched with result.

Lawrence et al. (2001) found that teeth maturity had not significant ($p>0.05$) effects on hot carcass weight among five dentition groups. He found in his research that the hot carcass weight was 334.2 kg, 352.7 kg, 349.7 kg, 342.1 kg and 328.1kg with T_1, T_2, T_3, T_4 and T_5 dental age maturity groups of cattle, respectively. It was disagreement with results of the present study that Lawrence et al. (2001) stated the animal trial with similar weight groups with different teeth maturity group. Lucero-Borja et al. (2014) stated in his research that age and sex has a highly significant ($p<0.0001$) effect on dressing percentage of the carcass, similar to those observed in the present study ($p<0.01$). He showed that the dressing percentage was 55.74, 50.50, 53.40 and 50.91 in heavier heifer, lighter heifer, steer and cow, respectively. According to Lawrence et al. (2001) teeth maturity had a significant ($p<0.05$) effect on KPH among five dentition groups. It appears in the (Table 1) that teeth maturity had a significant ($p<0.001$) effect on KPH of the indigenous cattle which is well in agreement with findings of Lawrence et al. 2001. Regarding to KPH%, Jaturasitha et al. (2009) proposed an adequate carcass to have 3.86% and 5.52% relation to its weight in grass and legume grass fed cattle, respectively had a significant effect ($p<0.05$) on carcass weight, similar to those observed in the present study ($p<0.01$). Lucero-Borja et al., (2014) stated in his research that age and sex has a highly significant ($p<0.0001$) effect on KPH% of the carcass, similar to those observed in the present study ($p<0.01$). He showed that the KPH% was 2.76, 1.32, 1.40 and 1.51 in heavier heifer, lighter heifer, steer and cow, respectively.

Table1. Summary statistics for live animal and carcass measures of indigenous cattle (n=50)

Parameter	T_1	T_2	T_3	T_4	T_5	P value	Sig. level
	Mean±SE	Mean±SE	Mean±SE	Mean±SE	Mean±SE		
Girth, inch	48.10^c±1.49	52.60^b±0.88	57.50^a±1.98	59.60^a±1.54	59.60^a±0.99	<.0001	***
Length, inch	39.25^c±0.96	43.10^b±1.12	45.95^{ab}±1.04	47.25^a±1.07	49.40^a±1.56	<.0001	***
Predicted live wt., kg	140.48^b±11.68	182.45^b±10.26	235.68^a±21.85	258.22^a±20.55	267.57^a±16.14	<.0001	***
Live wt., kg	141.21^b±11.26	181.87^b±10.16	233.08^a±22.06	255.20^a±21.05	262.05^a±15.08	<.0001	***
Hot carcass wt., kg	68.51^b±6.92	90.13^b±5.54	120.48^a±11.59	134.83^a±10.98	139.45^a±8.72	<.0001	***
Chilled carcass wt., kg	67.16^b±6.78	88.36^b±5.44	118.11^a±11.36	132.19^a±10.76	136.71^a±8.55	<.0001	***
DP on hot carcass	47.71^c±1.44	49.48^{bc}±1.22	51.61^{ab}±1.02	52.84^a±0.77	53.12^a±0.30	0.001	**
DP on chilled carcass	46.78^c±1.41	48.51^{bc}±1.20	50.60^{ab}±1.00	51.81^a±0.76	52.08^a±0.29	0.001	**
KPH% on hot carcass basis	2.45^b±0.08	3.02^a±0.12	2.35^b±0.20	3.36^a±0.28	3.11^a±0.23	0.002	**
KPH% on chilled carcass basis	$2.50b^c$±0.09	3.07^{ab}±0.12	2.40^c±0.21	3.42^a±0.29	3.18^a±0.23	0.002	**

T_1 = 0 Permanent incisor, T_2 = 2 Permanent incisors, T_3 = 4 Permanent incisors, T_4 = 6 Permanent incisors, T_5 = 8 Permanent incisors; Means with different superscripts in a row differ significantly; NS= non-significant, ***=p<0.001, **=p<0.01; *=p <0.05.



(a) Live weight (b) Hot carcass weight

Figure 1. Live and hot carcass weight change at different dental age groups.

From the (Figure 1) it was revealed from the data trend that maximum live weight was achieved at the dental age of two to four permanent incisors. Similar trend was also observed in the case of hot carcass weight. This figure also predicts that the farmers would be benefited more by rearing indigenous cattle for fattening purpose aged from two to four permanent incisors.

Primal cuts of beef cattle

In this experiment, primal cuts percentage (chuck and rib) of indigenous cattle did not significantly differ with the advancing of teeth maturity, but this had a significant effect (p<0.05) on round and loin (Table 2). In this experiment chuck percentage of indigenous cattle comprised 24.65, 24.55, 24.74, 23.94 and 24.18; round percentage comprised 23.19, 23.71, 24.27, 25.35 and 23.91; loin percentage was 15.89, 17.45, 19.33, 17.09 and 17.57 and rib percentage was 8.74, 10.756, 10.88, 8.70 and 10.17 among the teeth maturity group (Table 2).

Retail product yield from the four primal cuts (chuck, rib, loin, and round) is an economically important trait for the beef industry (Tait et al., 2005). Boggs and Merkel (1990) and USDA, 1997 found in their research that yield grade was based upon the yield of boneless, closely trimmed, retail cuts from the round, loin, rib and chuck. These four wholesale cuts make up approximately 75% of the weight and about 90% of the carcass value. Individually round comprises about 23% of the carcass weight; loin comprises 17%; rib comprises 9% and chuck comprises 26% of the weight (Table 2).

Jaturasitha et al. (2009) found in his animal trial that after slaughter 3 years old cattle grazing on grass and legume grass showed that chuck comprised about 27.09% and 26.98%; rib comprised 8.56% and 9.19%; round comprised 22.56% and 21.93%; and loin (shortloin and sirloin) 18.50% and 18.63%, respectively on the basis of feeding regime. In the present trial (Table 2) it is well in agreement with finding of Jaturasitha et al. (2009) where rib% is higher in Thai native cattle than that of indigenous cattle in Bangladesh.

Crossbreeds of indigenous and improved breeds are often superior in lean accretion and percentage compared to purebred indigenous breeds (Lee et al., 2007). Accordingly, Wheeler et al. (1990) described an inferior carcass quality of Brahman (Zebu) vs. Hereford and crossbreeds of either Brahman × Hereford or Hereford × Brahman. Also, other findings (Lee et al., 2007) suggest that carcass quality of indigenous cattle in Asia is inferior to that of crossbreeds and improved breeds. Overall, it seems that present native cattle, among Asian native cattle, are particularly light in an adult stage and, as such, particularly inferior to crossbreeds or imported breeds in carcass traits.

Table 2. Primal cuts of indigenous cattle (n=30)

Parameter	T_1	T_2	T_3	T_4	T_5	P value	Sig. level
	Mean±SE	Mean±SE	Mean±SE	Mean±SE	Mean±SE		
Hot carcass wt., kg	$72.47^{c}\pm5.61$	$78.26^{c}\pm7.44$	$109.13^{b}\pm5.28$	$127.86^{a}\pm8.57$	$130.43^{a}\pm2.26$	<.0001	***
Chuck %	24.65±0.53	24.55±0.48	24.74±0.10	23.94±0.52	24.18±0.30	0.8585	NS
Round%	$23.19^{b}\pm0.37$	$23.71^{b}\pm0.52$	$24.27^{ab}\pm0.65$	$25.35^{a}\pm0.35$	$23.91^{b}\pm0.21$	0.0233	*
Loin%	$15.89^{b}\pm0.45$	$17.45^{ab}\pm0.77$	$19.33^{a}\pm1.32$	$17.09^{ab}\pm0.26$	$17.57^{ab}\pm0.44$	0.0568	*
Rib %	8.74±0.37	10.75±1.84	10.88±1.65	8.70±0.11	10.17±0.95	0.5486	NS

T_1 = 0 Permanent incisor, T_2 = 2 Permanent incisors, T_3 = 4 Permanent incisors, T_4 = 6 Permanent incisors, T_5 = 8 Permanent incisors; Means with different superscripts in a row differ significantly; NS= non-significant, ***=p<0.001, **=p<0.01; *=p <0.05.

Edible non-carcass parts

At slaughter, live and carcass weights of the different teeth maturity group of cattle fed on feedlot were not similar (Table 3). Proportions of valuable edible organs and other body parts also showed teeth maturity group effects. All teeth groups differed (p< 0.001) for weight% of the head relative to body weight (BW) with the highest value for T_1 and lowest value for T_5. The relative weight% of the full Gastrointestinal tract (GIT) tended to differ (p< 0.001) between teeth maturity types with lower values for T_5 and higher values for T_1 and others (T_2, T_3 and T_5) were being intermediate. Similar trend was shown that the relative weight % of the empty GIT was empty GIT tended to differ (p< 0.05) between teeth maturity types with lower values for T_5 and higher values for T_1 and others (T_2, T_3 and T_5) were being intermediate. Lungs with trachea, liver and kidney weight % as a proportion of empty body weight (EBW) were significantly (p<0.01) higher for T1 than for other teeth maturity groups (T_2, T_3, T_4 and T_5). Differences among treatments in heart, spleen and tongue weight were not significantly varied.

In agreement with the present results (Table 3), O'Ferrall and Keane (1990) found that the proportion of head and metabolic organ e.g., stomach, intestine etc. decreased, with increasing slaughter weight. However, in that study the combined lungs, liver, heart and kidney proportion also decreased with increase of live weight. In the present study (Table 3), increasing dental maturity increased live weight (p<0.001) and decreased lung with trachea, liver, heart and kidney portion which is agreement with findings of McGeel et al. (2008). It is also noted that this variation is due to greater life span that provided greater weight to the group of animals with 8 permanent incisors (Hossain et al., 2021; Duarte et al., 2011).

In another study Jaturasitha et al. (2009) in Thai native bull where he found that the proportion of heart liver, lung with trachea and spleen expressed with relative to live weight was not significantly varied of bull with fed on grass and legume grass. This result is partially agreed with the present study (Table 3) where live and lung with trachea were significantly (p<0.01) varied with the advances of dental age.

Table 3. Edible non-carcass parts of indigenous cattle (n=33)

Parameter	T_1	T_2	T_3	T_4	T_5	P value	Sig. level
(% of live weight)	Mean±SE	Mean±SE	Mean±SE	Mean±SE	Mean±SE		
Live wt., kg	130.73^d±11.17	169.02^{cd}±11.34	201.36^{bc}±12.58	236.20^{ab}±15.86	268.11^a±25.40	<.0001	***
Carcass wt., kg	61.59^d±6.43	83.046^{cd}±5.99	102.92^{bc}±7.42	126.42^{ab}±10.34	143.73^a±14.18	<.0001	***
Liver	1.65^a±0.05	1.24^b±0.04	1.39^b±0.13	1.27^b±0.08	1.30^b±0.08	0.0053	**
Heart	0.35±0.02	0.33±0.01	0.36±0.03	0.32±0.02	0.42±0.05	0.2615	NS
Kidney	0.24^a±0.01	0.19^b±0.01	0.18^b±0.01	0.16^b±0.01	0.17^b±0.01	0.0014	**
Lung with trachea	1.02^a±0.09	0.77^{bc}±0.04	0.90^{ab}±0.07	0.68^c±0.03	0.72^{bc}±0.02	0.0034	**
Brain	0.25^a±0.02	0.20^b±0.01	0.20^b±0.01	0.15^b±0.01	0.16^b±0.01	0.0002	**
Spleen	0.33±0.03	0.26±0.03	0.32±0.07	0.25±0.01	0.27±0.03	0.4808	NS
Full gut	28.85^a±2.00	22.82^b±2.04	19.46^{bc}±1.28	16.41^c±1.44	16.22^c±1.25	<.0001	***
Empty gut	3.87^a±0.05	3.30^b±0.12	3.55^{ab}±0.16	3.29^b±0.25	3.42^b±0.15	0.0353	*
Head	5.13^a±0.12	4.60^{bc}±0.22	4.90^{ab}±0.15	4.35^c±0.21	4.24^c±0.16	0.0046	**
Tongue	0.34±0.02	0.27±0.01	0.33±0.03	0.27±0.04	0.26±0.03	0.0564	NS

T_1 = 0 Permanent incisor, T_2 = 2 Permanent incisors, T_3 = 4 Permanent incisors, T_4 = 6 Permanent incisors, T_5 = 8 Permanent incisors; Means with different superscripts in a row differ significantly; NS= Non significant, ***=p<0.001, **=p<0.01; *=p <0.05.

Inedible non-carcass parts

It has been shown in (Table 4) that increasing live weight increased (p<0.001) carcass weight and non-significantly decreased the weight of blood when expressed relative to live weight where the exception was T_4 (3.50%), was slightly higher than that of T_3 (3.49%). Increasing live weight increased non-significantly the hide weight in case of T_1 (8.32%), T_2 (8.52%) and T_3 (8.78%), but the increasing trend was not observed in the case of T_4 (8.63%) and T_5 (8.70%) when expressed relative to live weight. The weight% of tail was significantly (p<0.05) varied among the different teeth maturity groups. It is shown in (Table 4) that the non-significantly greater proportion of hide, the largest individual non-carcass part, and the lower proportion of sexual organs (testes and penis) of different teeth maturity groups of indigenous cattle is in agreement with the findings of Jaturasitha et al. (2009) who compared in Thai native bull cattle fed on grass and legume grass.

Table 4. Inedible non-carcass parts of indigenous cattle (n=33)

Parameter (% of live weight)	T_1	T_2	T_3	T_4	T_5	P value	Sig. level
	Mean±SE	Mean±SE	Mean±SE	Mean±SE	Mean±SE		
Live wt., kg	130.73^d±11.17	169.02^{cd}±11.34	201.36^{bc}±12.58	236.20^{ab}±15.86	268.11^a±25.40	<.0001	***
Carcass wt., kg	61.59^d±6.43	83.046^{cd}±5.99	102.92^{bc}±7.42	126.42^{ab}±10.34	143.73^a±14.18	<.0001	***
Blood	3.98±0.25	3.57±0.25	3.49±0.15	3.50±0.22	3.28±0.11	0.2083	NS
Hide	8.32±0.23	8.52±0.31	8.78±0.29	8.63±0.36	8.70±0.60	0.8938	NS
Tail	0.21^a±0.01	0.20^a±0.02	0.17^{ab}±0.02	0.14^b±0.01	0.14^b±0.02	0.0226	*
Testes	0.19±0.03	0.15±0.01	0.17±0.02	0.15±0.01	0.15±0.01	0.5126	NS
Penis	0.18±0.02	0.18±0.02	0.20±0.03	0.19±0.03	0.22±0.02	0.6601	NS

T_1 = 0 Permanent incisor, T_2 = 2 Permanent incisors, T_3 = 4 Permanent incisors, T_4 = 6 Permanent incisors, T_5 = 8 Permanent incisors; Means with different superscripts in a row differ significantly; NS= Non significant***=p<0.001, **=p<0.01; *=p <0.0.

Conclusions

From this study it can be concluded that the finishing weight of this type of cattle could be ranges from 141.21 kg to 262.05 kg with reasonable dressing percentage irrespective of teeth maturity groups and maximum live weight gain and hot carcass weight was achieved in the dental age groups of two to four permanent incisors. Therefore, in the context of Bangladesh two to four permanent incisors beef cattle are promising for fattening than others dental age group.

Conflicts of Interest

The authors declare that there are no potential conflicts of interests.

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