



Carcass traits and value of meat and byproducts of buffalo

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ABSTRACT

A study was conducted to collect data on carcass traits covering 1,005 buffaloes across India. The results indicated that the live weight and dressed carcass weight of buffaloes ranged from 174.82 to 422.83 kg and 79.08 to 213.73 kg, respectively with an average dressing percentage of 47.92%. There was a significant difference in the overall dressing percentage and overall yield of blood, skin and intestine of buffaloes of different body weight groups, viz. less than 200 kg (group 1), between > 200 to <300 kg (group 2), >300 to <400 kg (group 3) and more than 400 kg (group 4). It was also found that the majority of the buffalo slaughtered were in the weight group of >300 to >400 kg (43.08%) and >200 to <300 kg (40%). The overall average live weight of buffaloes from southern part of the country (Andhra Pradesh) was lower (278.26 kg) when compared to the northern part (Uttar Pradesh). Further, the proportion of low body weight buffaloes (below 300 kg) utilized for meat production was more in Andhra Pradesh (70%) and in Uttar Pradesh proportionately higher body weight animals (more than 300 kg) were slaughtered more (Mathura 92.33%, Bareilly 46.8%). The yield of edible (head, feet, stomach with content, heart, liver, kidney and fat) and inedible byproducts (blood, skin, intestine with content and lungs) as percentage of live buffalo weight were 27.61 and 24.45%, respectively. In terms of commercial value of buffalo carcass, major revenue comes from meat (88.66%), followed by skin (6.6%) and edible offal (5.0%).

Key words: Buffalo, Byproducts, Carcass traits, Meat

Buffaloes play a pivotal role in the rural economy of India. As per the 19th Livestock survey, India possesses 108.7 million buffaloes which constitutes 21.23% of total livestock population (DADF 2014). There are seventeen well defined Indian breeds such as Murrah, Jaffarabadi, Surti, Mehsana, etc. in addition to large number of non descriptive buffaloes (Ranjhan and Pathak 1983). Though buffalo is a triple purpose animal, they are primarily raised for milk production. Meat from buffalo is a byproduct of milk industry, because most of the buffalo meat produced is from spent animals which have completed their productive life in terms of milk production (Kondaiah *et al.* 1983). Present meat production in India is estimated at 6.27 million tonnes, of which buffalo contributes about 23.33% of the country's total meat production. India is the largest buffalo meat exporter in the world with total export of 1.31 million tonnes worth ₹ 26,685 crores in the year 2015 – 16 (APEDA 2017).

Being an extremely important animal for rural

development and export earning, buffalo meat industry need to be closely studied. Information on carcass component is essential to evaluate the economical potential of any meat producing animal (Kondaiah *et al.* 1983). Based on these data, measures could be formulated to increase the production of meat through integrated approach such as optimizing nutritional and managerial inputs with adequate disease control measures in order to express the genetic merit of indigenous animal for bringing gainful advantages in body weight gains and carcass yield. The breed, sex and slaughter weight have significant effect on carcass composition and meat quality. The data available on the carcass traits of buffaloes are mostly restricted to small group of experimental animals and there is no detailed study covering large number of animals of various states. Further, details on economics of meat production are scanty. Keeping this in mind, a survey was undertaken in different parts of India to get insights into yield and value of carcass and byproducts of buffaloes.

MATERIALS AND METHODS

Data collection: Among the Indian states, Uttar Pradesh produces about one-third of the buffalo meat, followed by Maharashtra and Andhra Pradesh. Therefore, these 3 states were taken for the study. Data on yield and value of meat and byproducts of buffalo was collected from 1,005

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buffaloes from Andhra Pradesh (250), Maharashtra (205) and Uttar Pradesh (550). Parameters collected included live buffalo weight (by pooling carcass and byproducts weight), carcass weight and weights of different byproducts, viz. blood, head, fore feet, skin, stomach, intestine, liver, lungs, heart, kidney, fat, hind feet and trimmings using electronic weighing balance. Data from Andhra Pradesh and Maharashtra was collected by the National Research Centre on Meat, Hyderabad and Veterinary College, Nagpur, respectively. Whereas, data in Uttar Pradesh were collected by Indian Veterinary Research Institute, Izatnagar, Bareilly and Veterinary College, Mathura. The data were collected from local body slaughterhouses as well as export slaughterhouses.

Statistical analysis: The data collected were compiled and grouped under different live weight categories, viz. less than 200 kg (group 1), between > 200 to <300 kg (group 2), >300 to <400 kg (group 3) and more than 400 kg (group 4) and statewise (Andhra Pradesh, Maharashtra and Uttar Pradesh). The data were analyzed using statistical software (SPSS for Windows, version 13.0) following the standard procedure for analysis of variance (Snedecor and Cochran 1995) and Duncan's multiple range tests for comparing the means to determine the effect of slaughter weight and state on carcass traits.

RESULTS AND DISCUSSION

Average carcass and byproducts weight (kg) and the yield as percentage of live weight of buffaloes of different body weight groups collected from various states are given in Table 1 and Table 2.

Live weight of buffaloes: The percentage of animals of different live weight groups, viz. less than 200 kg (group 1), between > 200 to <300 kg (group 2), >300 to <400 kg (group 3) and more than 400 kg (group 4) utilized for meat production were 5.07, 40, 43.08 and 11.84%, respectively. It is worth to note that majority of buffaloes slaughtered for meat production belonged to body weight range of between > 200 to <300 kg (group 2) and >300 to <400 kg (group 3) with a national average weight of 310.38 kg (Table 1). The FAO report on average live weight of buffaloes used for meat production in India also indicated a similar weight (FAOSTAT 2015). Table 2 revealed that the overall average live weight of buffaloes from southern part of the country (Andhra Pradesh) was lower (278.26 kg) when compared to the northern part (Uttar Pradesh). Further, the proportion of low body weight buffaloes (below 300 kg) utilized for meat production was more in Andhra Pradesh (70%), while in Uttar Pradesh, proportionately higher body weight animals (more than 300 kg) were slaughtered more (Mathura 92.33%, Bareilly 46.8%). The wider variation in the live weight of buffaloes between southern and northern parts of country is also evident from the earlier studies. Appa Rao *et al.* (2009) reported the overall live weight of south Indian non descriptive buffaloes as 223 kg, whereas Kondaiah *et al.* (1983) reported overall slaughter weight of buffalo as 345 kg in Uttar Pradesh. In addition to wide

Table 1. Overall yield of carcass and byproducts (%) as percentage of live weight of buffaloes of different weight groups

Weight groups	No. of buffalo	Live weight	Blood	Head	Fore feet	Skin	Stomach	Intestine	Heart	Liver	Lung	Kidney	Fat	Trimming	Hind feet	Carcass
<200	51	174.82± 3.88	5.62± 0.14 (9.82± 0.53)	5.57± 0.08 (9.70± 0.28)	2.16± 0.04 (3.78± 0.14)	9.97 ^{bc} ± 0.19 (17.42± 0.60)	16.62 ^b ± 0.40 (29.08± 1.46)	5.51 ^b ± 0.13 (9.61± 0.37)	0.44± 0.01 (0.76± 0.03)	1.27 ^b ± 0.03 (2.21± 0.09)	1.18 ^b ± 0.03 (2.06± 0.08)	0.36 ^b ± 0.01 (0.62± 0.03)	1.47± 0.09 (2.57± 0.26)	2.91 ^c ± 0.10 (5.09± 0.35)	1.73± 0.07 (3.02± 0.23)	45.18 ^a ± 0.30 (79.08± 2.36)
>200 – <300	402	260.35± 1.38	5.95 ^a ± 0.05 (15.46± 0.19)	5.28 ^{bc} ± 0.03 (13.74± 0.10)	2.02 ^b ± 0.02 (5.23± 0.05)	10.10 ^c ± 0.07 (26.28± 0.22)	15.48 ^a ± 0.14 (40.42± 0.52)	6.30 ^c ± 0.05 (16.34± 0.13)	0.43± 0.00 (1.13± 0.01)	1.05 ^a ± 0.01 (2.73± 0.03)	0.98 ^a ± 0.01 (2.53± 0.03)	0.30 ^a ± 0.00 (0.78± 0.01)	1.66± 0.03 (4.29± 0.09)	1.67 ^a ± 0.04 (4.36± 0.13)	1.80± 0.02 (4.68± 0.08)	46.99 ^a ± 0.11 (122.37± 0.84)
>300 – <400	433	341.88± 1.33	6.44 ^b ± 0.05 (22.09± ±0.18)	5.06 ^{ab} ± 0.03 (17.24± 0.09)	1.80 ^{ab} ± 0.02 (6.12± 0.05)	9.47 ^b ± 0.07 (32.20± 0.21)	15.28 ^a ± 0.14 (52.17± 0.50)	5.54 ^b ± 0.05 (18.84± 0.13)	0.42± 0.00 (1.43± 0.01)	0.96 ^a ± 0.01 (3.28± 0.03)	0.90 ^a ± 0.01 (3.06± 0.03)	0.26 ^a ± 0.00 (0.89± 0.01)	1.88± 0.03 (6.43± 0.09)	1.92 ^{ab} ± 0.03 (6.64± 0.12)	1.68± 0.02 (5.71± 0.08)	48.38 ^b ± 0.10 (165.77± 0.81)
>400	119	422.83± 2.54	6.42 ^b ± 0.09 (27.02± 0.35)	4.76 ^a ± 0.05 (20.13± 0.18)	1.66 ^a ± 0.03 (7.04± 0.09)	8.51 ^a ± 0.13 (35.96± 0.40)	15.16 ^a ± 0.26 (64.35± 1.00)	4.86 ^a ± 0.09 (20.51± 0.24)	0.40± 0.01 (1.68± 0.02)	0.99 ^a ± 0.02 (4.21± 0.06)	0.94 ^a ± 0.02 (3.97± 0.05)	0.25 ^a ± 0.01 (1.08± 0.02)	1.76± 0.06 (7.40± 0.17)	2.26 ^b ± 0.07 (9.61± 0.23)	1.46± 0.04 (6.15± 0.15)	50.58 ^c ± 0.20 (213.73± 1.55)
Overall	1005	310.38	6.20 (19.40)	5.14 (15.80)	1.89 (5.76)	9.63 (29.53)	15.41 (47.74)	5.76 (17.57)	0.42 (1.31)	1.02 (3.11)	0.95 (2.91)	0.28 (0.86)	1.75 (5.49)	1.91 (6.00)	1.70 (5.22)	47.92 (149.69)

Values in parenthesis indicate weight in kg. ^{a-c}Means within a column, not sharing a common superscript, differ significantly (P<0.05)

Table 2. Overall yield of carcass and by products (%) as percentage of live weight of buffaloes of different states

State	No. of buffalo	Live weight	Blood	Head	F. feet	Skin	Stomach	Intestine	Heart	Liver	Lung	Kidney	Fat	Trimming	H. feet	Dressed carcass
Andhra Pradesh	250	278.26 ^{a±}	5.71 ^{a±}	5.39 [±]	1.99 ^{b±}	9.98 ^{b±}	15.82 ^{ab±}	6.15 ^{b±}	0.42 ^{a±}	1.15 ^{b±}	1.07 ^{b±}	0.33 ^{c±}	1.32 ^{a±}	1.85 [±]	1.82 ^{b±}	47.00 ^{a±}
		4.06	0.03	0.03	0.02	0.06	0.10	0.05	0.00	0.01	0.01	0.01	0.00	0.02	0.03	0.02
UP (Bareilly)	250	302.25 ^{b±}	15.88 [±]	14.99 [±]	5.47 [±]	27.62 [±]	43.99 [±]	16.97 [±]	1.17 [±]	3.18 [±]	2.94 [±]	0.92 [±]	3.72 [±]	5.03 [±]	5.03 [±]	131.36 [±]
		4.86	0.24	0.22	0.08	0.38	0.71	0.23	0.01	0.05	0.11	0.01	0.01	0.09	0.08	0.08
UP (Mathura)	300	363.46 ^c	5.04 ^a	5.14	1.87 ^{ab}	8.95 ^a	18.09 ^b	5.44 ^a	0.40 ^a	1.18 ^b	1.07 ^b	0.32 ^c	1.18 ^a	2.43 ^b	1.53 ^a	47.36 ^a
		±2.49	±0.05	±0.06	±0.03	±0.12	±0.24	±0.09	±0.00	±0.01	±0.01	±0.02	±0.01	±0.03	±0.07	±0.03
Maharashtra	205	281.76 ^a	14.99 [±]	15.39	5.58	26.82	55.45	16.18	1.21	3.59	3.20	0.97	3.52	7.51	4.60	143.24
		±2.67	0.21	±0.27	±0.11	±0.50	±1.26	±0.29	±0.02	0.40 ^a	0.85 ^a	0.85 ^a	±0.02	±0.08	±0.27	±0.10
Overall	1005	310.38	7.09 ^b	4.87	1.63 ^a	9.03 ^a	14.07 ^a	5.05 ^a	0.40 ^a	0.85 ^a	0.85 ^a	0.21 ^a	2.24 ^b	2.13 ^{ab}	1.53 ^a	50.06 ^b
		±2.67	±0.03	±0.03	±0.01	±0.07	±0.10	±0.10	±0.02	±0.00	±0.00	±0.00	±0.00	±0.01	±0.01	±0.04
Overall	1005	310.38	25.94	17.54	5.87	32.51	50.74	18.25	1.43	3.07	3.09	0.75	8.10	7.71	5.54	182.92
		±2.67	±0.26	±0.05	±0.03	±0.19	±0.36	±0.09	±0.01	±0.02	±0.02	±0.11	±0.01	±0.03	±0.04	±0.14
Overall	1005	310.38	6.91 ^b	5.23	2.18 ^c	10.93 ^c	13.63 ^a	6.73 ^b	0.49 ^b	0.90 ^a	0.79 ^a	0.28 ^b	2.27 ^b	2.84 ^b	2.03 ^b	46.61 ^a
		±2.67	±0.02	±0.02	±0.01	±0.02	±0.04	±0.02	±0.01	±0.01	±0.01	±0.01	±0.01	±0.04	±0.03	±0.01
Overall	1005	310.38	19.50	14.74	6.15	30.80	38.52	18.99	1.39	2.53	2.24	0.79	6.26	1.03 [±]	5.72	131.29
		±2.67	±0.21	±0.15	±0.07	±0.30	±0.43	±0.19	±0.02	±0.03	±0.21	±0.01	±0.01	±0.08	0.03	±0.06
Overall	1005	310.38	6.20	5.14	1.89	9.63	15.41	5.76	0.42	1.02	0.95	0.28	1.75	1.91	1.70	47.92
		±2.67	±0.02	±0.02	±0.01	±0.02	±0.04	±0.02	±0.01	±0.01	±0.01	±0.01	±0.01	±0.04	±0.03	±0.01
Overall	1005	310.38	19.40	15.80	5.76	29.53	47.74	17.57	1.31	3.11	2.91	0.86	5.49	6.00	5.22	149.69
		±2.67	±0.02	±0.02	±0.01	±0.02	±0.04	±0.02	±0.01	±0.01	±0.01	±0.01	±0.01	±0.04	±0.03	±0.06

Values in parenthesis indicate weight in kg. ^{a-c}Means within a column, not sharing a common superscript, differ significantly (P<0.05).

variation in the kind of local variety of buffaloes available in different states of the country, their managerial practices (culled animal from urban dairies are of large body weight groups), age of slaughter, indiscriminate cross breeding practices across the country, transport of animals from one part of the country to another for meat production could be the reasons for huge variation in body weights of buffaloes reaching for slaughter (Kondaiah *et al.* 1983, Ranjan and Pathak 1983, Sharma *et al.* 1995).

Carcass weight and dressing percentage of buffaloes: The carcass weight and dressing percentage of groups 1–4 buffaloes were 79.08, 122.37, 165.77 and 213.73 kg and 45.24, 47.06, 48.49 and 50.55%, respectively. There was a significant (P<0.05) difference in the overall dressing percentage of buffaloes of different body weight groups and the dressing percentage increased with increase in the body weight. The increase in dressing percentage with increase in the body weight and age of the buffaloes was also observed by Appa Rao *et al.* (2009). This could be due to comparatively lower yield of offal in higher body weight animals. The overall average carcass weight of buffaloes ranged from 131.29 (Nagpur, Maharashtra) to 182.92 kg (Mathura, Uttar Pradesh). This indicates that the carcasses of buffaloes produced in the southern part of the country are of medium and low weight, whereas carcasses are higher weight recorded in the northern part of the country. Similarly, Appa Rao *et al.* (2009) reported the overall carcass weight of south Indian non descriptive buffaloes as 98.88 kg with a dressing percentage of 45.17%, whereas Kondaiah *et al.* (1983) reported overall carcass weight of 159.87 kg with a dressing percentage of 46.38% in Uttar Pradesh. The current study also revealed an overall carcass weight and dressing percentage of 149.69 kg and 47.92%, respectively (Table 2). This was in accordance with the FAO report on average carcass yield for Indian buffaloes, which is estimated as 140 kg (FAOSTAT 2015). Padda *et al.* (1986) also reported that average dressing percentage of non-descriptive culled buffaloes was around 46%. Higher body weight group showed higher dressing percentage when compared to lower body weight groups. This was in accordance with Sharma *et al.* (1995), Sarma and Sharma (1997) and Appa Rao *et al.* (2009).

Edible byproducts weight and yield: There was a significant (P<0.05) difference in the overall yield of edible byproducts (head, feet, liver, heart, kidneys, stomach and fat) of buffaloes of different body weight groups collected from various states. However, Sarma and Sharma (1997) and Appa Rao *et al.* (2009) reported non-significant difference in the yield of edible offal due to variation in the age and body weight of buffaloes. Cheek meat, brain and tongue harvested from head also forms edible part of buffaloes. The average head weight ranged from 14.74 kg in Maharashtra to 17.54 kg in Mathura, Uttar Pradesh with a national average of 15.80 kg. Head constituted about 5.14% of the live weight. Sarma and Sharma (1997) also reported similar yield (4.74 to 5.10%) of head in Murrah

buffaloes. The yield of feet (both fore and hind feet) ranged from 3.12 to 3.89% with a national average of 3.59%. Padda *et al.* (1986) also reported an average yield of feet with hooves as 3.78 to 4.0%. However, Sarma and Sharma (1997) reported a lower proportion of feet ranging from 2.43 to 2.95%. The overall yield of edible offal, viz. liver, kidney and heart were similar to the reports of Appa Rao *et al.* (2009), which was reported as 1.20 to 1.40, 0.24 to 0.31 and 0.39 to 0.60, respectively.

Inedible byproducts weight and yield: There was a significant ($P < 0.05$) difference in the overall yield of blood, skin and intestine of buffaloes of different body weight groups collected from various states. Sarma and Sharma (1997) also reported influence of slaughter weight on the yield of blood, hide and GI tract. The overall yield of blood ranged from 5.62 to 6.44% with an average of 6.20% of the live weight of the buffaloes. The variation in the quantum of blood yield in different body weight groups of buffaloes of various states could be due to variation in the body weight of the animals, bleeding practices and physiological condition of the animals. Normally blood constitutes about 2.4-8% of the total live body weight. Bleeding releases about 50% of the blood present in the body (Ockerman and Hansen 2000). Appa Rao *et al.* (2009) also reported average yield of blood between 4.12 and 5.32% of live weight of buffaloes.

Skin/hide is the very important and high valued inedible byproducts from buffaloes and its price ranged from ₹ 830 to 1,770 with an average value of ₹ 1,250 (Table 3). Well finished value added skin fetches high remuneration. The skin constituted about 8.95% of the total live weight of buffaloes in Uttar Pradesh to 10.93% in Maharashtra with a national average of 9.63%. The average skin weight ranged from 17.42 kg in below 200 kg body weight group to 35.96 kg in above 400 kg body weight group with a national average weight of 29.53 kg. The percent yield of skin recorded in the present study was comparable to those reported by Pathak *et al.* (1987) (8.56 to 10.25%) and Sarma and Sharma (1997) (10.6 to 11.15%).

Value of saleable meat and byproducts of buffaloes: The parts of the buffalo carcass which have commercial value

include meat, edible and inedible byproducts. When an animal is slaughtered, about one-third of it is harvested as meat and the rest comprise byproducts and waste. More than half of the animal byproducts are not suitable for normal consumption, because of their unusual physical and chemical characteristics (Jayathilakan *et al.* 2012). Heart, liver and kidney constitute major component of edible byproducts in buffaloes (Lakshmanan *et al.* 1984).

The average weight of heart, liver and kidney were about 1.31, 3.11 and 0.86 kg, respectively. These organs together constituted 1.72% of the live weight. Further, cheek meat, brain and tongue harvested from head also forms edible part of buffaloes. Stomach, which is also consumed as variety meat, is usually sold as unit, not on weight basis. Though the fore and hind feet do not contain much meaty portion, are used for soup preparation (*Paya*) and curry preparation (Lakshmanan *et al.* 1984). Fat also forms edible part of food animals. The proportion of fat in the carcass reflects the nutritional status of animals and therefore high variation exists in the fat content. The proportion of fat content has ranged from 1.47% in buffaloes of below 200 kg weight group to 1.89% in buffaloes of above 300 kg weight group. Similarly, Sarma and Sharma (1997) reported an average fat content of 2.18% in buffaloes weighing 260 kg. Based on the prevailing market price collected from the various parts of the country, the value of meat, edible byproducts and skin contributed about 88.66, 5.0 and 6.6% of total value of animal, respectively. The report of FICCI based on the data collected during the year 2013 revealed that the meat, edible byproducts and skin of buffaloes weighing 200 kg represented around 90.7%, 7.4% and 2.0% of value of animal (FICCI 2013).

It may be inferred from the study that wider variation was observed in the live weight of buffaloes utilized for meat production in different states and the overall average live weight of buffaloes from southern part of the country (Andhra Pradesh) were lower (278.26 kg) when compared to the northern part (Uttar Pradesh). The overall average live weight of buffalo was 310.38 kg and average carcass weight was 149.69 kg, which indicates an average dressing percentage of 47.92%. There was a significant difference

Table 3. Value (in rupees) of live animal, meat and byproducts of buffaloes of different weight groups

Weight group (kg)	Live animal	Head	Feet	Stomach	Heart	Liver	Kidney	Fat	Skin	Bone	Boneless meat	Gross profit (%)
<200	11350	140 (1.07)	140 (1.07)	125 (0.95)	30 (0.23)	90 (0.69)	25 (0.19)	125 (0.95)	830 (6.33)	110 (0.84)	11500 (87.69)	15.55
>200 – <300	16900	200 (1.04)	200 (1.04)	170 (0.89)	45 (0.23)	110 (0.57)	30 (0.16)	175 (0.91)	1075 (5.60)	185 (0.96)	17000 (88.59)	13.55
>300 – <400	22200	225 (0.89)	225 (0.89)	195 (0.77)	60 (0.24)	130 (0.51)	35 (0.14)	320 (1.27)	1325 (5.24)	265 (1.05)	22500 (89.00)	13.87
>400	27500	300 (0.95)	300 (0.95)	250 (0.79)	70 (0.22)	170 (0.54)	45 (0.14)	370 (1.17)	1770 (5.59)	370 (1.17)	28000 (88.48)	15.07
Overall	20200	220 (0.96)	220 (0.96)	190 (0.83)	55 (0.24)	125 (0.54)	35 (0.15)	275 (1.20)	1250 (5.43)	240 (1.04)	20400 (88.66)	13.91

Values in parenthesis indicate percentage to total value of animal.

($P < 0.005$) in the overall dressing percentage and overall yield of blood, skin and intestine of buffaloes of different body weight groups collected from various states. It was also found that the majority of the buffalo slaughtered were in the weight group of $>300 - >400$ kg (43.08%) and >200 to <300 kg (40%). Further, the proportion of low body weight buffaloes (below 300 kg) utilized for meat production was more in Andhra Pradesh (70%) while in Uttar Pradesh comparatively higher body weight animals (more than 300 kg) were slaughtered more (Mathura 92.33%, Bareilly 46.8%). When expressed as percentage of live buffalo weight, the yield of edible (head, feet, stomach with content, heart, liver, kidney and fat) and inedible byproducts (blood, skin, intestine with content and lungs) were 27.61 and 24.45% respectively. In terms of commercial value of buffalo carcass, major revenue came from meat (88.66%), followed by skin (6.6%) and edible offal (5.0%).

Wide variations in the live weight of buffaloes observed in the present study provides scope for the scientific and applied research to evolve better breeding policy and managerial practices, which could enhance the buffaloes productivity. The scientific community could plan suitable interventions to improve the genetic potential and husbandry practices, thereby enhance the milk and meat production in the country. Traders could choose specific geographical areas to source the buffalo stock as per their requirement (medium or heavy weight animals). Further, efficient collection and utilization of byproducts into value added products is very essential not only to reduce the environmental pollution but also essential to improve the economics of meat production and sustainability of livestock sector.

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