

## MEAT PRODUCTION FROM EGYPTIAN BUFFALOES

### I.—Developmental changes and dressing percentage in a group of buffalo males.

By

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#### SUMMARY

This work was carried out at the Animal Breeding Dept. Experimental Farm Faculty of Agriculture, University of Cairo, Giza (U.A.R.). Twenty four male buffaloes were used. Fifteen were divided to five groups, each of these comprised three animals slaughtered at ages of 50 days, 6, 12, 18 and 24 months. Nine animals were castrated and each group consisted of three animals slaughtered at the age of 12, 18 and 24 months as buffalo steers. The results is summarized in the following :

1. Live weights were 74.00, 157.67, 230.33, 359.33 and 449.00 kg at the ages of 50 days, 6, 12, 18, and 24 months. For steers of 12, 18 and 24 months live weights were 236.00, 360.33 and 450 kg respectively.

2. Average daily gains from birth to 50 days, from 50 days to 6 months, from 6 to 12 months, from 12 to 18 months and from 18 to 24 months of age were .67, .64, .40, .72 and .50 kg. The buffaloes gave 1 kg for body increase for every 8.22 kg of concentrates during the period from 6-12 months of age, meanwhile, it was 7.5 kg concentrates for the period from 12 to 18 months and 12.8 kg during the period from 18 to 24 months of age.

3. The body length, width, height at withers, heart girth, depth of chest, height and circumference of round were measured before slaughtering. There was no significant correlation between these measurements and the dressing percentage.

4. There was gradual increase in fatty tissues with advancing age in all groups except that of 6 and 24 months of age. On the contrary bonny tissues showed noticeable decrease. Lean tissues showed the least change with advancing age.

There was somewhat decrease in the relative weight of carcass, head, four legs, liver, heart and kidneys. On the other hand, the relative weight of hide increased as age advanced.

5. Dressing out percentage in male buffaloes were 59.92, 57.16, 53.67, 57.57 and 52.74% at the ages of 50 days, 6, 12, 18 and 24 months while it was 53.31, 54.47 and 54.30 % in buffalo steers at 12, 18 and 24 months.

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## INTRODUCTION

The Relatively high milk yield and fat percentage of the buffalo compared to the native cow has made it the main dairy animal of the U.A.R.

The role of the buffalo in meat production is rather secondary, since most of the meat comes either from surplus suckling male calves known as vitello (veal) or from culled animals. The situation of the indiginous cow is not different from that of the buffalo except that surplus male calves are reared up to older ages in view of using them as fattening steers and bulls.

The buffalo calves (vitello) are usually killed when they are 40 days old. There is a continuous and great demand for their meat which is not questioned from the stand-point of quality.

The buffalo population of the country is 1,395,019 (1960 Census) including 1,333,082 buffalo cows giving about 300,000 male calves yearly. Many authorities have suggested the rearing up to older ages and fattening of the buffalo calves as a means of increasing the output of meat. Some difficulties arose as the rearing of such big number of calves would consume a good amount of milk which the country needs so badly. Also the high mortality of the buffalo calves and the questioned meat quality of the rather older buffaloes were the hindering factors in following such a procedure.

Therefore, it was thought to investigate the possibility of using buffalo calves, bulls and steers for meat production from both the meat quantity and quality points of view. Total gain, efficiency of food utilization, dressing percentage, were worked out.

## MATERIAL AND METHODS

Twenty-four male buffaloes of five different ages were used in this study. Twenty were bought from the Tahreer Province while four were from the herd of the Faculty of Agriculture, Cairo University, Giza. A group comprised 3 veal calves were slaughtered at 50 days of age. Another group comprised 3 calves, were slaughtered at 6 months of age.

The remaining eighteen buffaloes were divided into two groups equal in weight and age (av. 315 days). One group consisted of nine animals were castrated by use of the Burdizzo. Three animals from each group were slaughtered as buffalo bulls or steers at the ages of 12, 18 and 24 months.

Buffaloes were fed on concentrates, hay and straw, and the amount varied according to age and stage of fattening (Table 3).

## SLAUGHTER TECHNIQUE

Animals left fasting for 12 hours prior to killing and live weight, body measurements were estimated. Killing animals were followed according to the rules of Islam, severing the head, atlas and cranium bones by using a sharp

knife. When bleeding was completed, the animals were skinned and dressed out. Hot carcasses were weighed and then were split carefully into two sides as is customary. Carcass measurements were taken. Fore and hind quarters were weighed separately. The right half of the carcass was divided into the following meat cuts and weighed : hind shin, top side, silver and back side, aitchbone, rump, thick flank, sir loin, thin flank, 5 rib piece, 8 rib piece, chuck, brisket, neck and fore shin.

Samples were taken from : sir loin, top side, chuck, and thin flank, for histological studies, chemical analysis and organoleptic test.

Meat cuts were removed to the cold storage for chilling at 0° C for 24 hours to determine shrinkage losses.

The organs and offals were measured and weighed as quick as possible to avoid losses through evaporation. The following parts were weighed in each animal in kilograms: head, hide, legs, lungs, trachea, and diaphragm including associated fat, heart freed from large blood vessels, pancreas, liver excluding gall bladder which was weighed separately with its contents, caul fat, digestive system, full and empty, bladder and testes.

The carcass composition or bone, fat and lean content was estimated by separating and dissecting the chilled meat cuts. This was carried out in the laboratory and always by the same butcher to eliminate the effect of evaporation and change of labour.

The exterior fatty tissue and that between muscles including connective tissues in the fat were trimmed from the lean and classified as separable fat, while cartilage was weighed with the bone and tendons were weighed with lean-meat.

### STATISTICAL ANALYSIS

Simple correlations coefficients were calculated according to Snedecor (1950) to prove the relation between dressing percentage and live animals measurements and between percentage of meat and carcass measurements.

## RESULTS AND DISCUSSION

### Developmental changes

#### *Live Weight :*

The results of the present study showed that there was gradual increase in body weight with advancing age (Table 1, Fig. 1). Average body live weights of male buffaloes were 74.00, 157.67, 230.33, 359.33 and 449 kg. at the ages of 50 days, 6, 12, 18 and 24 months respectively.

Ragab and Abdel Salam (1962) stated that the means of body weight at birth, 6, 12, 18 and 24 months in male buffaloes were 40.94, 151.55, 221.65, 325.43 and 409.76 kg. meanwhile Ahmed and Tantawi (1954) reported that the average body weights for the corresponding ages were 40.34, 127.28, 190.73, 275.48 and 334.43 kg. respectively.

The differences between the results obtained in this work and those reported by Ragab and Abdel Salam and Ahmed and Tantawi may be due to the fact that weights of animals reported by them were of growing animals, while those reported in the present study were of animals reared under fattening conditions.

TABLE 1.—Average Weights in Kgs of Buffalo Organs at Different Ages

Item	50 days Veals	6 months	12 months		18 months		24 months	
			Bulls	Steers	Bulls	Steers	Bulls	Steers
Live Weight . . .	74.00	157.67	230.33	236.00	359.33	360.33	449.00	450.38
Carcass Weight . .	42.47	86.67	123.61	125.8	200.43	190.20	236.80	244.52
Head Weight . . .	5.00	9.2	14.00	11.93	20.2	18.8	24.50	23.07
Hide Weight . . .	5.20	11.33	18.00	17.2	38.67	35.33	49.00	45.00
Legs Weight . . .	3.00	5.4	7.19	6.80	9.73	9.47	11.53	11.9
Digestive Full . . .	9.00	29.00	38.53	38.00	56.00	69.33	81.33	88.67
Digestive Empty . .	4.15	10.3	12.52	13.50	20.53	18.92	24.00	21.80
Liver Weight . . .	1.42	2.57	3.61	3.24	5.00	4.51	5.55	5.13
Spleen Weight . . .	.24	.40	.56	.47	.91	.88	1.00	.98
Heart Weight . . .	.45	.88	1.31	1.12	1.45	1.38	1.47	1.48
Lungs Weight . . .	1.41	2.80	6.14	7.58	6.48	8.09	11.37	13.22
Kidneys Weight . .	0.35	.77	.96	.80	1.29	1.28	1.07	1.38
Kidneys fat weight	.18	.11	1.69	1.75	1.87	2.39	2.09	2.13
Testes Weight . . .	0.3	.09	.16	—	0.30	0.07	0.35	0.08
Penis Weight . . .	.08	.17	.17	0.23	0.39	0.30	0.95	0.56
Caul Fat Weight . .	.36	.90	4.42	4.6	5.90	6.58	9.53	10.80

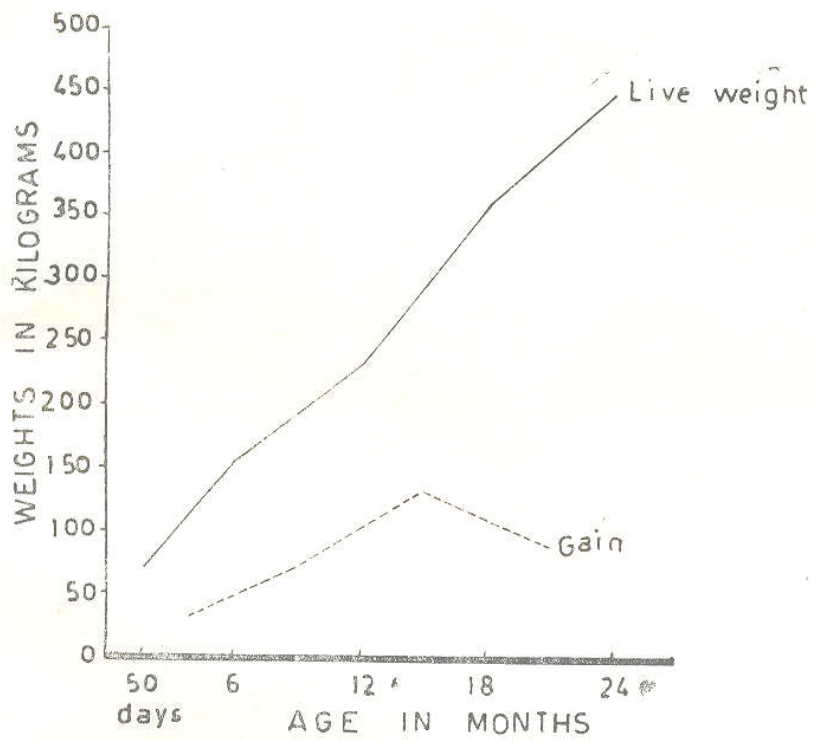


FIG. 1.—Growth and absolute gain per interval in Egyptian buffaloes.

**DEVELOPMENTAL CHANGES IN BUFFALO MALES**  
Photographs Taken at a Uniform Distance. The Square is  $10 \times 10$  cm.

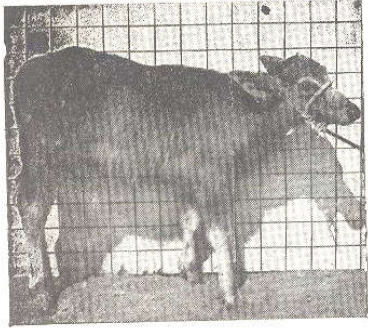


FIG. 2.—Age : 50 days

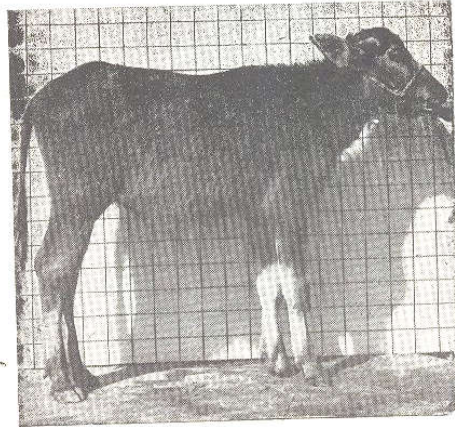


FIG. 3.—Age : 6 months

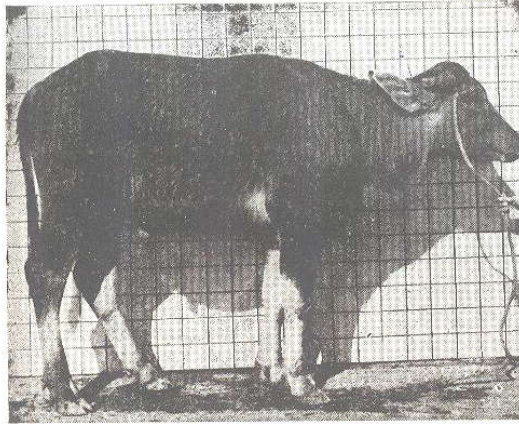


FIG. 4.—Age : 12 months

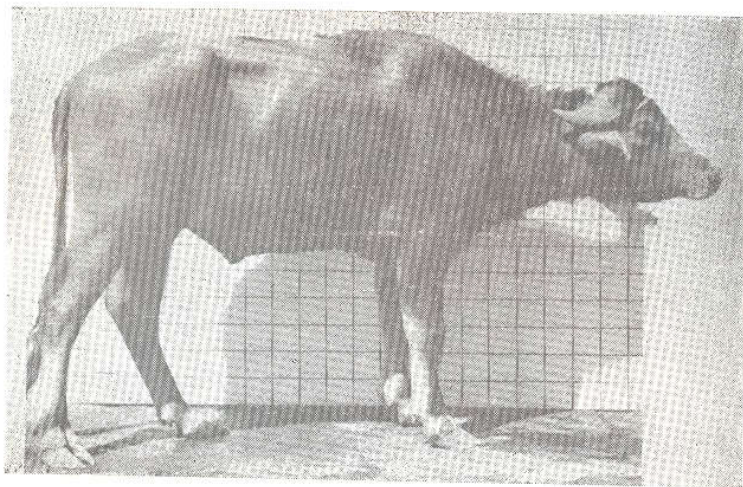


FIG. 5.—Age : 18 months

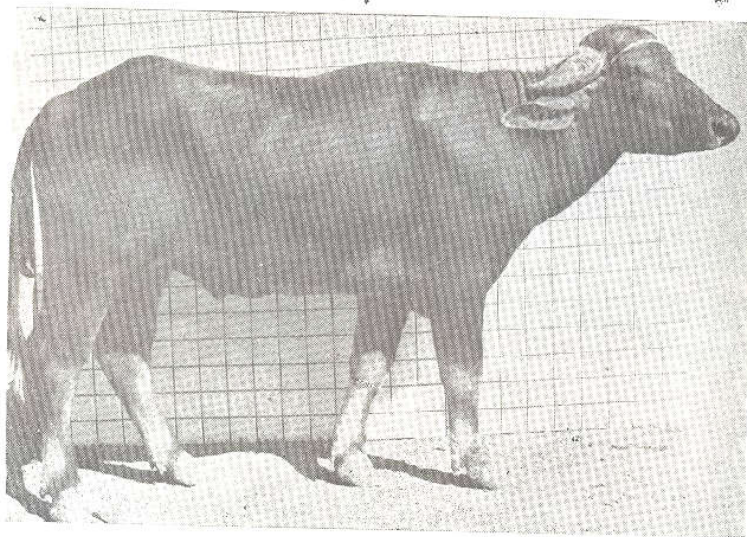


FIG. 6.—Age : 24 months

DEVELOPMENTAL CHANGES IN BUFFALO STEERS  
Photographs Taken at a Uniform Distance. The Square is  $10 \times 10$  cm.

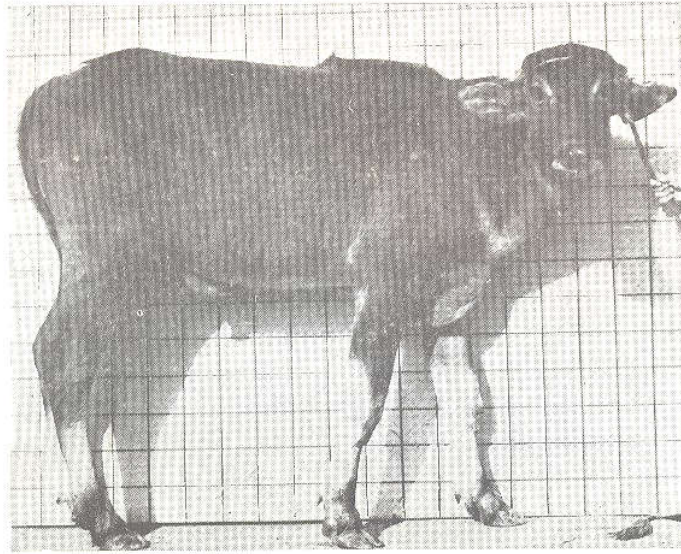


FIG. 7.—Age : 12 months

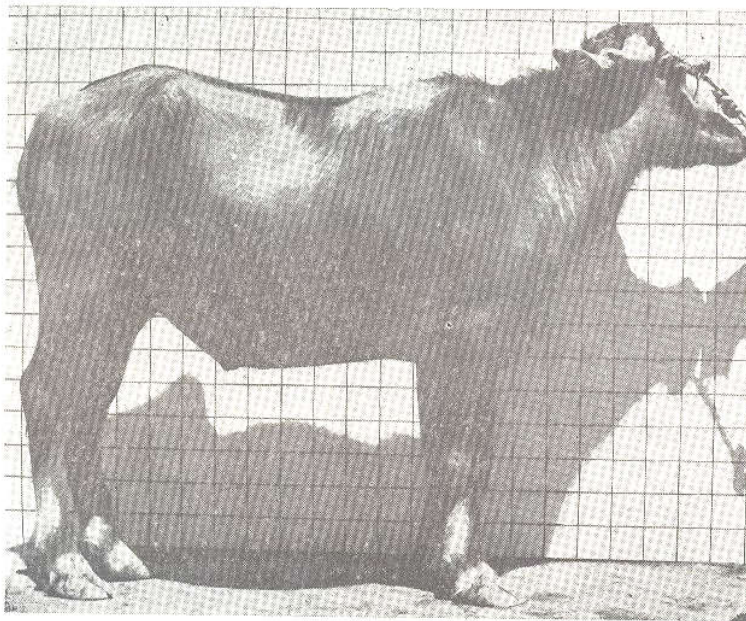


FIG. 8.—Age : 18 months



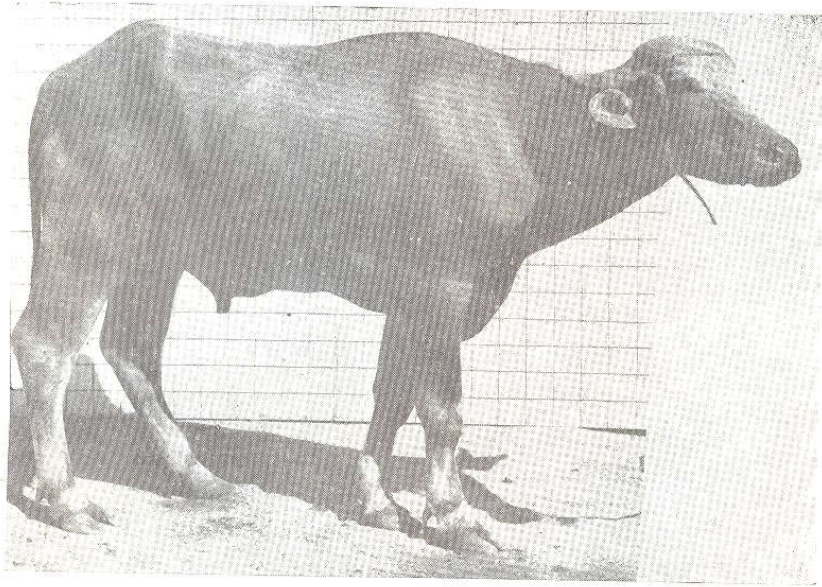


FIG. 9.—Age : 24 months

Ratios between the average live weights at the various ages on the one hand and average birth weight (40.9 kg) on the other, were 1.81, 3.86, 5.63, 8.78 and 10.98 at ages of 50 days, 6, 12, 18 and 24 months, while they were 5.77, 8.80 and 11.01 for steers at ages 12, 18 and 24 months.

It could be seen from (Table 1) that there was gradual increase in live weight, carcass weight and weight of different organs and parts of the body. When the organs of the animals were expressed as percentages of the live weight at killing (Table 2) and (Fig. 10) there was some what decrease in the relative carcass weight, head, legs and liver weight with advancing age, since fattening increases the rate of fat deposition. On the other hand the relative weight of hide increased with advancing age since the animals increase in size.

Daily gain from birth to 50 days, from 50 days to 6 months from 6 to 12 months, from 12 to 18 months and from 18 to 24 months of age were .67, .64, .40, .72 and .50 kg.

Ghoneim et al (1957) found that the averages of daily gain in buffaloes were .52, .46, and .61 kg. for the periods from birth to 6 months, 6 to 12 and from 12 to 18 months. Ragab and Abdel Salam (1963) reported the daily gain .659, .457, .389, .553, .445 during the periods from birth - 4, 4-6, 6-12, 12-18 and 18-24 months, of ages in another herd of Egyptian buffaloes.

TABLE 2.—Relative Weight of Different Organs to Live Weight at Different Ages of Buffaloes

Item	50 days	6 months	12 months		18 months		24 months	
			Bulls	Steers	Bulls	Steers	Bulls	Steers
Live Weight . . .	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
Carcass Weight . .	57.39	54.97	53.67	53.31	55.78	52.78	52.74	54.29
Head Weight . . .	6.76	5.83	6.08	5.06	5.62	5.22	5.46	5.12
Hide Weight . . .	7.03	7.19	7.81	7.29	10.76	9.80	10.91	9.99
Legs Weight . . .	4.05	3.42	3.12	2.88	2.71	2.63	2.57	2.64
Digestive Sys. Full.	12.16	18.39	16.73	16.10	15.58	19.24	18.11	19.69
Digestive Sys. Empt	5.61	6.53	5.44	5.72	5.73	5.25	5.34	4.84
Liver Weight . . .	1.92	1.63	1.57	1.37	1.39	1.25	1.24	1.14
Spleen Weight . . .	.32	.25	.21	.20	.25	.24	.22	.22
Heart Weight . . .	.61	.56	.57	.48	.40	.38	.33	.33
Lungs & Trachea.	1.91	1.78	2.67	3.21	1.80	2.25	2.53	2.94
Kidneys Weight . .	.47	.49	.42	.34	.36	.35	.24	.31
Kidneys Fat . . .	.24	.07	.73	.74	.52	.66	.47	.74
Testes Weight . . .	.04	.06	.0	—	.08	.19	.08	.02
Penis Weight . . .	.11	.11	.07	.10	.11	.08	.21	.12
Caul Fat Weight . .	.49	.57	1.92	1.95	1.64	1.83	2.12	2.40

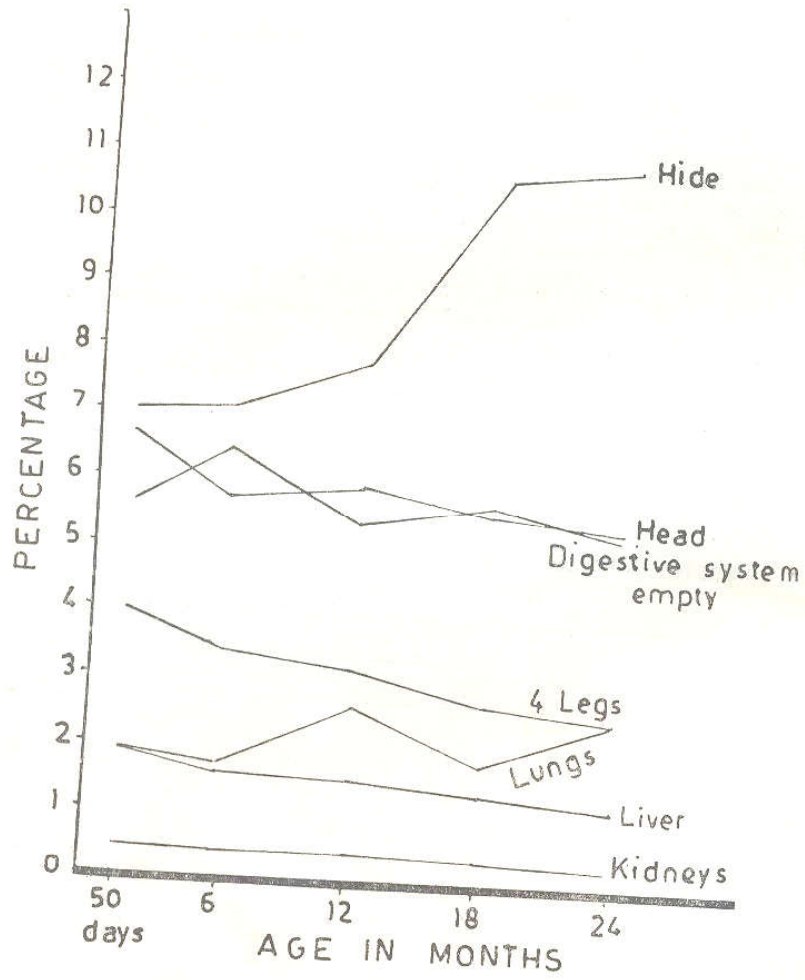


FIG. 10.—Relative weight of organs as percentage of live weight in Egyptian buffaloes.

It is clear that the daily gains reported in this work were the highest then followed by those of Ghoneim *et al.* and at last comes those reported by Ragab and Abdel Salam. This discrepancy in the results could be explained on the basis of the fact that the buffaloes studied in this work were always under the highest level of feeding as they were actually fattened. Also Ghoneim derived his figures from animals which were more or less under a high level of feeding, while Ragab and Abdel Salam data represented growing animals.

Since most of the beef is produced by fattening bulls or steers at the age of 9-12 months for a period of 6 months it is interesting to compare the meat output of buffaloes during this period of age in both indiginous and beef cattle. Asker and Ragab reported that the average daily gain of indiginous bullocks was .60 when fed absolutely on concentrates while Kamar *et al* (1962) reported .55 daily when bullocks were fattened on berseem. The beef cattle are reported to gain daily on average 0.9 to 1.1 kgs during this period of age. Phillips (1953), Ittner *et al* (1955).

It seems that buffaloes are not less in beef output than the indiginous cattle but still far from the beef cattle in this respect.

When studying the feed efficiency of buffaloes (Table 3) it was found that the group killed at the age of 12 months gained on the average, .4 kg per day and consumed 3.3 kg concentrates over and above the hay and straw. It could be concluded that the buffaloes gave 1 kg of body increase for every 8.25 kg of concentrates during this period of age. The ratio was 1 : 7.5 for the period from 12 to 18 months and 1 : 14.8 during the period from 18 to 24 months of age.

It could be concluded that buffaloes should be best when they are 12 months old and finished for not more than the age of 18 months. This is in accordance with what is known about cattle in this respect. It seems that the highest circle of growth which is attained at such age is responsible for this comparatively high feed efficiency. Also puberty which occurs at the beginning of this stage may be indirectly and partly responsible for this condition since the increase of male sex hormones is known to accelerate growth. This agrees with Gassner *et al* (1958), Burgess and Lamming (1960) who reported that administration of testosterone increased rate of gain and feed efficiency.

TABLE 3.—Feed Intake, Feed Efficiency and Costs of 1 kg. Gain in Buffaloes During Three periods of Life

Period months	Daily gain Kg.	Ration per daily gain			Ration per 1 kg gain			Starch equi- valent	P.T.
		Concen- trate	Hay	Straw	Concen- trate	Hay	Straw		
6 - 12	.40	3.3	4.0	1.2	8.25	10.00	3.00	8.4	21
12 - 18	.72	5.4	1.0	3.7	7.50	1.39	5.14	5.96	13
18 - 24	.50	7.4	2.5	3.6	14.80	5.00	7.2	11.65	24

TABLE 4.—Relative Weight of Edible Organs to Carcass-Weight

	50 days	6 months	12 months		18 months		24 months	
			Bulls	Steers	Bulls	Steers	Bulls	Steers
Carcass . . . . .	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
Liver . . . . .	3.34	2.97	2.92	2.58	2.50	2.37	2.34	2.17
Heart. . . . .	1.06	1.02	1.06	.89	.72	.73	.62	.63
Kidneys . . . . .	.82	.89	.78	.64	.64	.67	.45	.59
Kidneys Fat . . .	.42	.13	1.37	1.39	.39	1.26	.88	.90
Testes . . . . .	.07	.10	.13	—	.15	.04	.15	.03

It also seems that the developmental changes which the buffalo calves have gone through are not only confined to the feature of the body. It could be seen from (Table 4), that the relative weights of the edible organs to the carcass weight decreased as age advanced.

#### Organs and Tissues

The fat of the body comes mainly from three different sources *i.e.*, carcass fat, caul fat and kidney fat. When comparing the three sources to each other (Fig. 11) it could be concluded that the important source of fat is that of the carcass since it starts and develops at the highest level of all sources. In general fat irrespective of its source increases with advance in age reaching its maximum at the age of 12 months for both caul and kidneys' fat while the carcass fat keeps on increasing till the age of 18 months when it reaches its maximum. It could be inferred that the period from 12 to 18 months of age represents the period when most of the fat is deposited.

This adds one more evidence to the importance of fattening buffaloes from 12 to 18 months of age.

The development of the proportion of lean tissues, bone tissues and fatty tissues as percentage of the carcass weight are shown in (Table 5) and (Fig. 12).

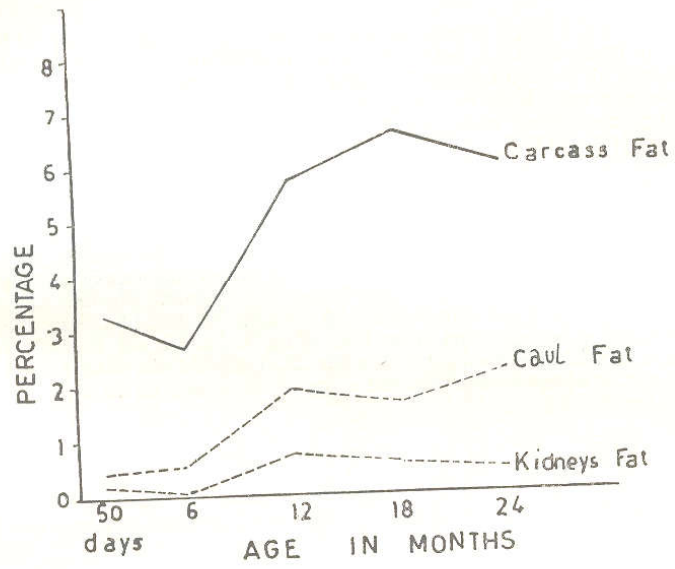


Fig. 11. Carcass, kidneys, and caul fat as percentage to live weight.

There was gradual increase with advancing age in the fatty tissues with exception of 6 and 24 months of age. On the contrary there was noticeable decrease in bonny tissues (Table 5). Lean tissues showed the least variation at the different ages.

When the weight of lean, fat and bone was expressed in terms of the live weight (Table 6), it was indicated that the lean nearly keeping its percentage constant all through the period of study while fat percentage increased with advancing age. Bone percentage decreased with advancing age in all ages and groups. These results agreed with those reported by Callow (1947).

The fat percentage in beef cattle exceeded that in Egyptian buffaloes. The present results are 13.47 and 12.26 for 1½ and 2 years old meanwhile Damon *et al* (1960) stated fat percentage in the Angus, Hereford, Brangus and Brahman cattle 32.9, 26.4, 22.3 and 21.1 respectively. However it is very difficult to decide that the difference in fat is due to difference in the ability of both animals in this concern since feeding was different. The beef animals may be more efficient than buffaloes in fattening tendency but nevertheless the excess of fat deposition in the body at the level observed in beef cattle is not liked in this country therefore this criterion could not be taken against the buffalo except from its indirect effect on the quality of the meat before or after cooking.

TABLE 5.—Lean, Fat and Bone Weight and its Relative Weight to the Right Half side of Carcass After Chilling

Item	Age	50 days	6 months	12 months		18 months		24 months	
				Bulls	Steers	Bulls	Steers	Bulls	Steers
Lean Wt. . . .		13.17	26.81	37.55	36.88	60.17	62.66	75.51	76.86
Lean % . . . .		68.52	69.91	67.00	64.75	67.49	66.75	69.83	66.52
Fat Wt. . . . .		1.23	2.19	6.60	8.57	12.01	12.90	13.60	17.38
Fat % . . . . .		6.34	5.71	11.78	15.05	13.47	13.89	12.56	15.04
Bone Wt. . . .		4.82	9.31	11.46	10.79	16.72	17.14	17.61	19.97
Bone % . . . .		24.85	24.28	20.45	18.94	18.76	18.45	16.26	17.28

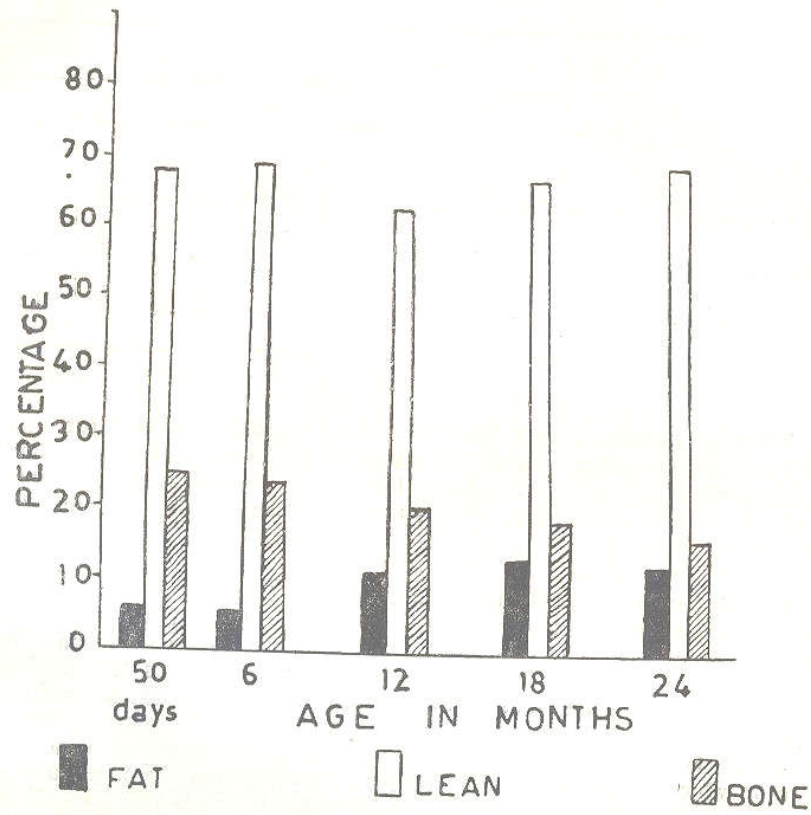


FIG. 12.—Developmental changes in the percentage of fatty, muscular, and bony tissues as percentage of carcass weight.



TABLE 6.—Carcass Components as Percentage of Live Weight

	50 days	6 months	12 months		18 months		24 months	
			Bulls	Steers	Bulls	Steers	Bulls	Steers
Lean . . . . .	35.39	34.01	32.61	31.25	33.49	34.81	33.68	34.13
Fat. . . . .	3.32	2.78	5.73	7.26	6.68	7.17	6.06	7.72
Bone . . . . .	13.03	11.81	9.95	9.14	9.31	9.52	7.84	8.87

Castration seems to have the same effect in buffaloes as in cattle. At the age of two years, buffalo steers were superior in the percentage of fat than buffalo bulls (Fig. 13). The differences being 3.27, .42 and 2.48 at the ages of 12, 18 and 24 months of age. Bonny tissues were somewhat greater in bulls than buffalo steers.

Callow (1947) indicated that in meat animals (sheep, swine and cattle) the ratio between subcutaneous and intermuscular fatty tissues increased during fattening. Such increase was 3 fold in cattle, but two fold only in sheep, while it was still smaller in pigs. In this work it appears that during growth and fattening there was a pronounced increase in sub-cutaneous fatty tissues (Fig. 14). According to Hammond who stated that domestication favours the later developing parts of the body by providing higher planes of nutrition which means in other words that domestication favours subcutaneous fatty tissues than intermuscular tissues. It seems that the effect of increasing the plane of nutrition is most remarkable in buffaloes than in cattle and less than in the case of pigs and sheep. This means that buffaloes could be rated as the least domesticated animals, in farm livestock. This is in line with the results obtained by many others working on the different characteristics of buffaloes, who generally agreed that the level of characters such as growth rate, fertility, behaviour and milking ability are far below the level of their corresponding characters in cattle Knapp (1956).

#### Dressing Percentage

Dressing percentages were 59.92, 57.16, 53.67, 57.57, and 52.74 for buffaloes of 50 days, 6, 12, 18 and 24 months of age, but for steers were 53.31, 54.47, and 54.30 of animals 12, 18 and 24 months old (Table 7).

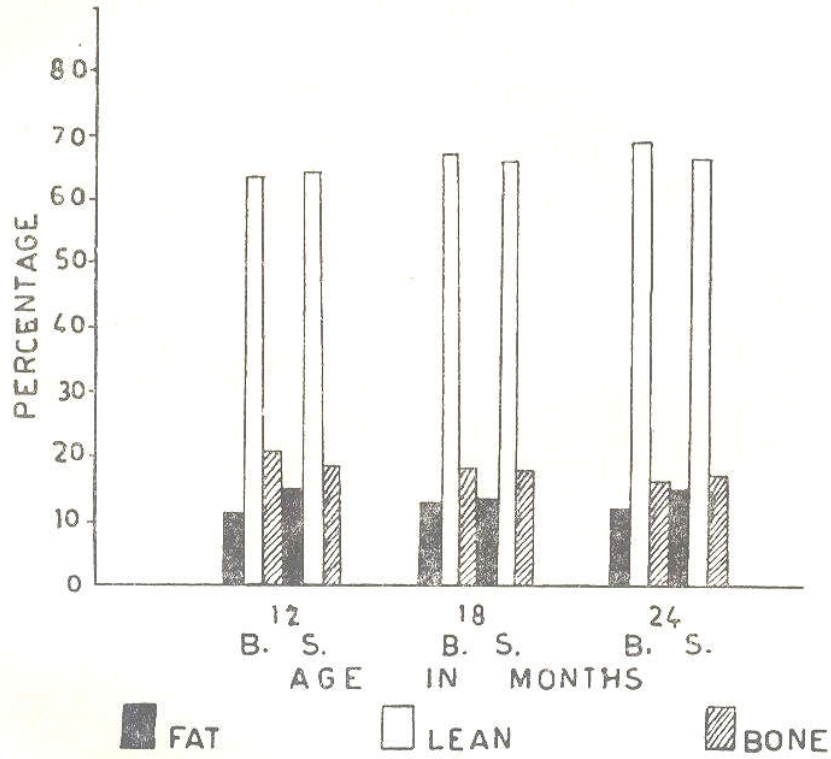


FIG. 13.—Comparison between fatty, muscular, and bony tissues as percentage of carcass weight in Bulls (B.) and Steers (S.).

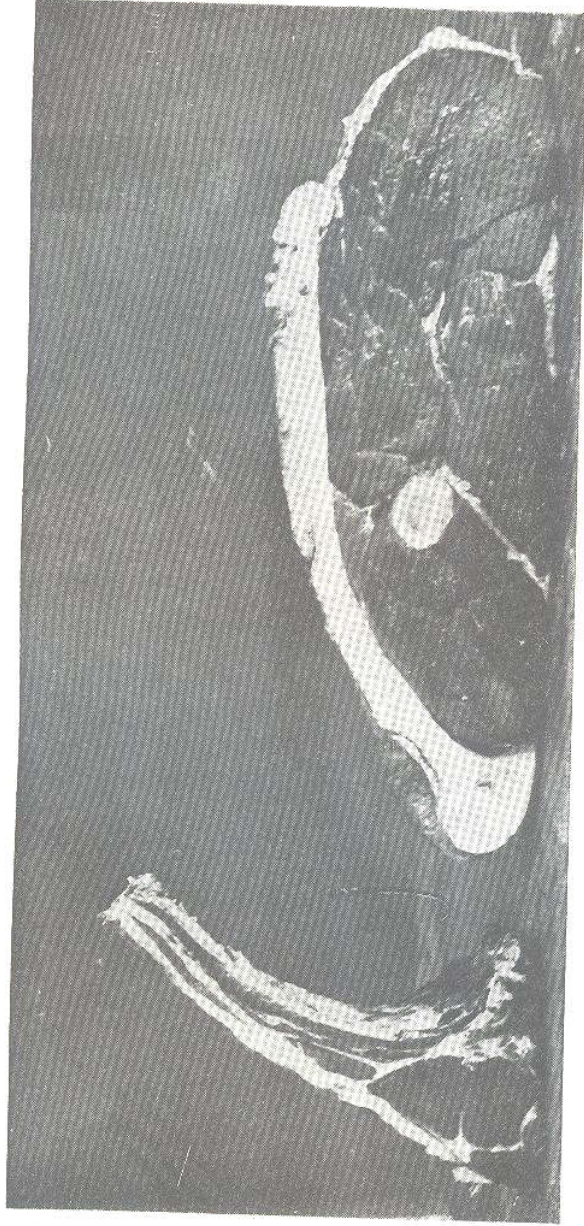


FIG. 14.—Round and ribs of a two years old steer showing sufficient subcutaneous external fat in both cuts.

Badreldin (1955) estimated the dressing percentage 66% of buffalo sucklings classified as veals. The difference may be due to age since our veal calves were 50 days old at killing meanwhile Badreldin studied the animals through the slaughter-house which had no fixed age.

Maymone (1942), reported that dressing percentage was 49.26 in 1.½ years old male Italian buffalo while it was 57.57 in this work. Undoubtedly such difference is expected since both breed and management, were different.

Dressing percentage ranged between 55.4% - 60.4% in Herefords Carroll (1955), Butler *et al* (1956).

In Egyptian bullocks, Badreldin and Abdel Hay (1947) reported dressing percentage of 52% and 55% in bulls and steers respectively, while Asker and Ragab (1959) found it to be 53.8% in bullocks. It may be concluded that Egyptian buffaloes dressed equal to dairy and dual purpose cattle.

Variation in fill or the proportionate weight of contents of the digestive tract and bladder also has a definite affect on the yield of carcass in relation to live weight. Fasting animals tend to dress high, full animals low (Table 7) Effect of fasting on the dressing percentage is high, so if the animals in this work were fasted more than 12 hours they should yield higher.

Averages of body measurements of buffalo bulls and steers were taken before slaughtering. Correlation, coefficient between dressing percentage on the one hand and heart girth, back length, height at withers, depth of chest and circumference of round on the other were 0.13, 0.17, 0.22, 2.34 and 0.13 respectively. They were statistically nonsignificant.

TABLE 7.—Average Dressing Percentage at Five Age Groups

Ages	50 days Veals	6 months Calves	12 months		18 months		24 months	
			Bulls	Steers	Bulls	Steers	Bulls	Steers
(*) . . . . .	59.92	57.16	53.67	53.31	57.57	54.47	52.74	54.30
(**) . . . . .	64.12	64.85	60.04	61.51	63.56	63.34	60.68	63.77
Diff. . . . .	4.20	7.69	6.37	8.20	5.99	8.87	7.94	9.47

(\*) Dressing percentage calculated on full live animals.

(\*\*) Dressing percentage calculated on empty live animals.

## GENERAL DISCUSSION

The consumption of meat in the U.A.R. is far from being met by local production. Each year a good number of slaughter cattle is imported from neighbouring countries, as well as frozen meat to fill in the gap.

This problem of deficiency in meat resources is of a dynamic nature since the population is ever increasing and the buying capacity of the people is always increasing.

This situation created a dangerous relative decrease in livestock population, since the butcher was always after slaughter animals at any price. Therefore, the prices for fattening calves reached a limit that left a doubtful narrow margin of profit.

The buffalo calves were usually killed when still suckling, providing a certain kind of baby beef which is very much liked by the consumers. Nevertheless, the quantity of meat from that source was rather limited since the average killing weight for the buffalo calf is about 60 kgs. It was then thought that if those animals are reared to an older age the amount of meat produced would undoubtedly be increased but the optimum age, quality of meat and the efficiency of food utilization were still in question.

The results obtained in this work answered to a certain limit such questions.

The average body live weights were 74.90, 157.67, 230.33, 359.33 and 449 kgs at ages of 50 days, 6, 12, 18 and 24 months respectively. It was observed that the animals double their live weight at the age of 6 months and again doubled that weight at the age of 18 months. From the economic standpoint buffalo calves which are slaughtered at the age of 40 days if reared up to the age of 6 months the output of meat from this source will be doubled without changing the quality of meat as indicated by the histological, chemical and organoleptic tests. Therefore, the buffalo calves should be raised on milk replacements and separated milk till the age of 6 months old. Since there will be variation in the growth of calves, it may be suggested that slow growing calves have to be killed at the age of 6 months while the fast growing ones may be kept till the age of 12 months and again at this period of age selection could be made and the slow growing animals are slaughtered while the still growing ones are kept till the age of 18 months.

Fattening surplus males of cattle up to two years of age is a common practice in the U.A.R. The final average weight for such bull calves was reported as 311.2 kgs by Asker and Ragab (1959) while Kamar *et al* (1962) stated that fattening calves with an average initial weights of 112 kgs they are finished at an average weight of 258 kgs, provided that they are fed only on clover.

Comparing the average weights of fattened buffaloes in this study with those of cattle it is clear that buffaloes reached the finishing weights reported for cattle at an earlier age.

When studying the feed efficiency it was found that one kg of live weight needed 8.4, 5.96, 11.65 starch equivalent during the periods from 6 to 12, 12 to 18 and 18 to 24 months of age. This adds another proof that fattening buffalo calves is best done during the period from 12 to 18 months, which is earlier by six months than cattle.

The cost of food in millims for daily gain was the highest (168) during the period from birth to 50 days. It was 85 millims for the period from 50 days to 6 months. During the period from 12 to 18 months it decreased to 83 millims and it was 123 millims from 18 to 24 months of age.

From the commercial point of view, the feeding expenses of 1 kg growth was the cheapest during the interval from 12-18 months old. It is clear that fattening male buffaloes to 18 months is the most economic of all ages studied. In general the Egyptian farmers prefer to get rid of their male buffalo calves at the earliest age possible in order to utilize the maximum of the buffaloes' milk. Therefore, the cost of veal calves is expected to be expensive since the milk price is relatively higher than concentrates due to heavy demand for milk.

Dressing percentage were 59.92, 57.16, 53.67, 57.57, and 52.74% at ages of 50 days, 6, 12, 18 and 24 months respectively. Meanwhile the meat bone ratio were 66.81, 65.41, 71.47, 72.03 and 75.35 for the corresponding ages. It is clear that fattening buffaloes to older ages especially to 18 months of age increased the dressing percentage and the meat bone ratio.

There was no significant differences between castrated and non-castrated animals either in live-weight or carcass weight, therefore it is not advised to castrate the calves since the public prefers non-castrated animals and lean meat.

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## انتاج اللحم من الجاموس المصرى

### ١ - دراسة النمو ونسبة التصافى في ذكور الجاموس

#### الملخص

تعتبر مشكلة اللحوم من الأمور الحيوية في الجمهورية العربية المتحدة ، وقد استهدفت هذه الدراسة بيان أهمية انتاج اللحوم من ذكور الجاموس المصرى من حيث الكمية والنوع وأنسب أعمار الذبح وقد أجريت هذه الدراسة بمحطة انتاج اللحوم قسم الانتاج الحيوانى بكلية الزراعة جامعة القاهرة .

شملت هذه الدراسة ٢٤ من ذكور الجاموس ذبح منها ١٥ عجلا في أعمار ٥٠ يوما ، ٦ ، ١٢ ، ١٨ ، ٢٤ شهرا بينما التسعة عجول الباقية خصيت وتم ذبحها في أعمار ١٢ ، ١٨ ، ٢٤ شهرا للمقارنة بين انتاج اللحوم من الذكور العادية والمخصيه من الجاموس .

وكانت هذه الحيوانات تغذى على العلائق المركزة مضافا اليها التبن والدريس وقليل من المادة الخضراء وتناخص النتائج فيما يلى :

أولا - كان متوسط أوزان الحيوانات حية للذكور الغير مخصية في أعمار ٥٠ يوما ، ٦ ، ١٢ ، ١٨ ، ٢٤ شهرا هي كالاتى :

٧٤ ، ١٥٧ر٦٧ ، ٢٣٠ر٣٣ ، ٣٥٩ر٣٣ ، ٤٤٩ كجم ، بينما كانت أوزان العجول المخصية في عمر ١٢ ، ١٨ ، ٢٤ شهرا هي ٢٣٦ ، ٣٦٠ر٣٣ ، ٤٥٠ر٣٨ كجم على التوالي .

واشتملت الدراسة أيضا على قياس طول الظهر ، عرض الحوض ، الأرتفاع عند الكتف ، عمق الجسم ، محيط الصدر عند القلب ، محيط الفخذ . ولا يوجد ارتباط معنوى بين هذه المقاسات في الحيوان الحى ونسبة التصافى .

ثانيا - كان متوسط الزيادة اليومية بالكجم في الفترة بين ٥٠ يوما ، ٦ أشهر وبين ٦ - ١٢ ، ١٢ - ١٨ ، ١٨ - ٢٤ شهرا هي كالاتى : ٦٤ر ، ٤٠ر ، ٧٢ر ، ٥٠ر / كجم على التوالي وعند دراسة القدرة التحويلية الغذائية للعلائق المعطاه وجد أن كل كيلو جرام نمو يحتاج الى ٨ر٢٥ ، ٧ر٥ ، ١٤ر٨ كجم مواد مركزة في خلال فترات العمر من ٦ - ١٢ ، ١٢ - ١٨ ، ١٨ - ٢٤ شهرا .



ومن هذا يتضح أن الفترة من ١٢ - ١٨ شهرا تصل الكفاءة التحويلية للغذاء في الجاموس الى أقصى درجاتها تحت ظروف هذه التجربة \*

ويبدو أن لدائرة النمو الثانية دخل كبير في رفع هذه الكفاءة التحويلية في هذا السن \* وقد يرجع ذلك أيضا الى أن هذه الفترة تقابل سن البلوغ حيث تعمل الهرمونات الذكرية الجنسية على تنشيط النمو \*

ثالثا - عند اجراء عملية التشافي لقطع اللحم وجد أن النسبة المئوية للحم الأحمر هي ٨٦ر٥٢ ، ٦٩ر٩١ ، ٦٣ر٤٤ ، ٦٧ر٤٩ ، ٦٩ر٨٣ % في أعمار ٥٠ يوما ، ٦٤ ، ١٢ ، ١٨ ، ٢٤ شهرا محسوبة الى وزن الذبيحة \* في حين كانت النسبة المئوية للدهن في هذه الأعمار ٦٣ر٤٤ ، ٥٧ر٧١ ، ١١ر٧٨ ، ١٣ر٤٧ ، ١٣ر٥٦ % والنسبة المئوية للعظام ٢٤ر٨٥ ، ٢٤ر٢٨ ، ٢٠ر٤٥ ، ١٨ر٨٦ ، ١٦ر٢٦ % في نفس الأعمار السابقة وذلك لعجول الجاموس الغير مخصية أما في العجول المخصية فكانت نسبة العضلات ٦٤ر٧٥ ، ٦٦ر٧٥ ، ٦٦ر٥٢ % في أعمار ١٢ ، ١٨ ، ٢٤ شهرا في حين كانت نسبة الدهن المئوية ١٥ر٠٥ ، ١٣ر٨٩ ، ١٥ر٠٤ % بينما بلغت نسبة العظام ١٨ر٩٤ ، ١٨ر٤٥ ، ١٧ر٢٨ % في الأعمار سالفة الذكر \*

رابعا - مع تقدم العمر كان هناك بعض التناقص في الأوزان النسبية لكل من الذبيحة والرأس والأرجل والكبد بينما كان هناك زيادة تدريجية في الوزن النسبي للجلد \*

أما الأوزان النسبية لكل من الجهاز الهضمي والرئتان فكانت متغيرة وذلك على أساس نسبتها الى الوزن الحي للحيوان \*

أما في حالة مقارنة الاعضاء الداخلية الى وزن الذبيحة فإنه مع تقدم العمر يحدث تناقص تدريجي في الوزن النسبي لكل من الكبد - القلب - الكليتان ودهنهما والخصيتان \*

خامسا - كانت نسبة التصافي في ذكور الجاموس في أعمار ٥٠ يوما ، ٦ ، ١٢ ، ١٨ ، ٢٤ شهرا هي ٥٩ر٩٢ ، ٥٧ر١٦ ، ٥٣ر٦٧ ، ٥٧ر٥٧ ، ٥٢ر٧٤ % في حين كانت نسبة التصافي في الذكور المخصية في أعمار ١٢ ، ١٨ ، ٢٤ شهرا هي ٥٣ر٣١ ، ٥٤ر٤٧ ، ٥٤ر٣٠ % \*