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Comparative Study of Meat Production from Cattle and Buffalo Male Calves

I. Effect of Roughage Concentrate Ratio in Ration on Rate of Gain and Feed Efficiency of Native Cattle, Friesian and Buffalo Calves

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Three groups of male calves each of sixty heads from Friesian, Native cattle and buffalo were used to invistigate the effect of three roughage concentrate ratios 1 : 0; 1 : 1 and 1 : 4 on the performance, daily live body weight increase and feed efficiency of growing calves weighing less than 200 kg initial weight and up to about 325 kg final live weight. Twenty two Animals of each of Friesian, local Cattel breed and buffalo calves were fed on all roughage and moderate concentrate rations (Roughage : Concentrate ratio 1 : 0 and 1 : 1 respectively). While on high concentrate ration 1 : 4 only 16 calves of each animal group were used.

The data indicate that the lowest daily body weight increase was that of Friesian on all roughage ration followed by buffalo and then native cattle on the same treatment. Increasing the proportion of concentrates in ration imporved daily gain in weight and feed efficiency.

Increasing the efficiency of meat production from Native cattle, baffloes and surplus male Friesian calves required detailed information on the most economic feeding practices to be used. Much have been said about the high efficiency of buffaloes in roughage utilization. The efficiency of Friesian calves in meat production compared to both native cattle and buffaloe was studied. There fore, this investigation was carried out to determine the effect of source of energy intake (Concentrate roughage ratio) in ration on growth and feed converting ability. Subsequent papers will disecuss the effect of such nutritional treat ments on -Animal performance during the finishing period and carcass quality.

Material and Methods

A total mumber of 180 calves, sixty of each of Friesian, Native cattle and buffalo, were used in this study. The average initial body weight of animals are shown in chart. 1 and Table 2.

Calves of both cattle breed and buffalo were divided into three groups as shown in Chart. 1.

TABLE 1. The daily feed comsumption/head under different nutritional treatments.

Live weight	A. treatment				B. treatment						C. treatment	
	Winter feeding		Summer feeding		Winter feeding			Summer feeding				
	Clover kg	Wheat straw kg	Sorghum kg	Wheat straw kg	Concent mix. kg	Clover kg	Wheat straw kg	mix kg	Sorgh kg	Wheet straw kg	Concent* trate kg	Wheat straw kg
150 — 199	34.0	2.0	25.0	2.0	3.0	12.0	2.0	3.0	9.0	2.0	5.5	2.0
200 — 249	38.0	2.0	27.0	2.0	3.5	16.0	2.0	3.5	11.0	2.0	6.0	2.5
250 — 299	41.0	3.0	29.5	3.0	4.0	19.0	2.0	4.0	13.0	2.0	6.5	3.00
300 — 349	44.0	3.0	31.0	3.0	4.5	19.0	3.0	4.50	13.5	3.0	7.0	3.5

(*) Concentrate mixture contained cotton seed cake 65%; wheat bran 9% Rice bran 20% lime — stone 20% salt 1% and molasses 3%.

CHART I

Animal	Scheme of the Experionent	
Friesien	All roughage (*A.* treatment)	*from* 191.9 *kg initial up to* 327.5 *kg final liveweight* 22 Animal
	50% Concentrate (*B.* treatment)	*from* 181.8 *kg initial up to* 318.6 *kg final live weight* 22 Animal
	80% concentrate (*C.* treatment)	*from* 187.4 *kg intial up to* 325.3 *kg final live weight* 16 Animals
Buffalo	All roughage (*A.* treatment)	*from* 164. *kg initial up to* 325 *kg final live weight*
	50% concentrate (*B.* treatment)	*from* 167.0 *kg initial up to* 336.7 *kg final live weight* 22 Animal
	80% concentrate (*C.* treatment)	*from* 197.6 *kg initial up to* 314.3 *kg final live weight* 16 Animals
Native	All roughage (*A.* treatment)	*from* 164.9 *kg initial up to* 320 *kg final live weight* 22 Animal
	50% concetrate (*B.* treatment)	*from* 199.6 *kg initial up to* 327.2 *kg final live weight* 22 Animal
	80% concentrate (*C.* treatment)	*from* 156.6 *kg initial up to* 356.5 *kg final live weight* 16 Animals

The first group 22 animal of each of friesian, Native cattle and buffalo were fed all roughage ration (A treatment) of wheat straw and Berseem (Trifolium Alexandrinium) in winter or wheat straw and sorghum in summer.

The second group, a number of 22 head of each cattle breed and buffalo were fed on moderate roughage concentrate ratio (The concentrate supplied about 50% of the energy intake in the ration.

In the third group, a number of 16 animals of each of cattle breed and buffalo were fed high concentrate ration (The concentrate supplied about 80% of the energy requirements).

The daily feed consumption of the animals of A, B and C treatments is shown in Table 1 respectively. Animal requirements were calculated according to Tommi allawances (1963).

The animals were weighed to the nearest kg. once per month before morning feeding and approximately 14 hrs fasting period.

Data were analysed statistically employing analysis of co-variance, analysis of variance, least significant differences and regression coefficient (Snedecor 1956).

Results and Discussion

Data Concerning changes in live body weight of different treatments are presented in Table 2. It is clear that animals in treatments B and C reached their expected final weight in a comparatively shorter time (ranging from 7 to 9 month). However, those of treatment A reached the same weight in much longer time (10-14 months). Almost similar results were reported by Isakov *et al* (1965), Creta (1969) and Bembridge (1964).

Animals kept on high concentrate ration (Ctreatment) irrespective of breed or species gained weight faster than those maintained on moderate concentrate ration.

It is evident that the lowest average daily gain was that of Friesian calves fed all roughage ration (A treatment), followed by buffaloes and Native cattle recieving the same treatment. However, these differences were not statisticaly significant ($P > 0.05$).

TABLE 2. **Average daily weight gain of the experimental animals on different Treatmentsfeeding**

Animal	Feeding treatment	Initial weight kg	Final weight kg	Total gain kg	daily gain kg
Friesian		191.9	327.5	135.6	0.360 ± 0.03
Native cattle	A	164.9	320.3	125.4	0.410 ± 0.03
Buffalo		164.2	324.2	160.0	0.380 ± 0.03
Friesian		181.2	318.6	136.8	0.58 ± 0.03
Native cattle	B	199.6	327.2	127.6	0.61 ± 0.03
Buffalo		167.0	336.7	169.7	0.61 ± 0.003
Friesian		187.4	325.3	137.9	0.68 ± 0.034
Native cattle	C	197.6	314.3	116.7	0.64 ± 0.034
Buffalo		156.5	356.5	199.9	0.71 ± 0.034

The results indicated clearly that the introduction of concentrates in the fattening rations in varying proportions caused an increase in daily gain. Differences between A *vs.* B and A *vs.* C in daily gain were highly significant which is in accordance with Forbes *et al.* (1965). Grelly *et al.* (1965) findings on Friesian calves and Abd El Rahman (1966) on male buffalo calves.

Such stimulating effect of the concentrate on the daily gain may be explained by the fact that feeding all roughage ration is accompanied by a noticeable increase in acetic acid production in the rumen while the concentrates increase propionic acid (Show *et al.* 1959).

Moreover, it has been reported by Blaxter (1962) that the heat increment of acetic acid is greater than that of propionic acid. This may explain the better performaance of calves fed on increasing amount of concentrate.

Buffalo calves on C treatment showed the highest daily gain compared to the other animal groups of different cattle breeds & buffalo under different treatments. It should be noted that the differences between B and C treatments irrespective of the breed did not show any significance ($P>0.05$) This agreed with El Hakeim (1971) On buffalo male calves. Nevertheless, differences between breeds and interaction between breed X treatments were not significant. It is worthnoting that the average daily weight increase in buffalo group fed C treatment was within the range obtained by El Ashry(1968) on buffalo males fed fattering ration; one third of its energy was from roughage source.

Analysis of variance for the relative daily gain indicate that the differences between treatments and also between breeds are highly significant, while the interaction between treatment X breed failed to be significant ($P>0.05$).

TABLE 3. Average relative daily weight gain

Animal	Treatment		
	A	B	C
Friesian	0.20 ± 0.02	0.32 ± 0.02	0.32 ± 0.022
Native cattle	0.22 ± 0.02	0.31 ± 0.02	0.32 ± 0.022
Buffalo	0.23 ± 0.02	0.37 ± 0.02	0.41 ± 0.022

Generally, concerning feed effeciency, there was a tendency towards a positive correlation between effeciency of feed convertion and the increased proportion of the concentrates in the ration Table 4.

TABLE 4. Average feed efficiency (kg S.E./kg gain)

Animal	Treatments		
	A	B	C
Friesian	11.6	6.5	5.9
Native cattle	9.6	6.3	6.0
Buffalo	11.8	5.7	5.9

It is evident that the effeciency of feed conversion is almost doubled in treatment C as compared with A treatment for both Friesian and buffalo. Such results are in accordance with those obtained on buffalo male calves by Abd El Rahman (1966) and El Hakiem (1971), who found that the effeciency of converting feed was 14.3 and 5.9 kg starch equivalent per kg live weight increase for all roughage and high concentrate rations respectively.

Increasing the level of concentrates from 50% up to 80% of the ration's energy improved the effeciency of feed utilisation by 10 and 5% for Friesian and Native cattle respectively. Lamming *et al.* (1966) and Lister *et al.* (1968) found that the rate of live weight gain and effeciency of feed conversion and digestible energy to live weight gain lowered by increasing forage over 30% in beef fattening rations.

On the other hand the highest effeciency obtained from buffalo calves was that of B treatment, which is in full agreement with El Hakiem *et al* findings (1971).

Concerning breed effect, Native cattle calves were more effecient than either Friesian or buffalo calves when fed free concentrate ration (A treatment). When concentrates composed 50% of the energetic value of the ration, buffalo calves were the most effecient (5.7 kg S.E. kg gain) followed by native cattle then the Friesian calves (6.3 and 6.5 kg respectively). No marked difference in the effeciency figures between the two cattle breeds or buffalo when calves were maintained on high concentrate ration (C treatment).

Cost of Feeding

The costs of feeds consumed per one kg live body weight gain are shown in Table No. 5.

TABLE 5. Average cost of feeding/one kg gain in Millim

Animal	Treatment		
	A	B	C
Friesian	257	156	143
Native cattle	213	144	146
Buffalo	255	137	143

It was evident that the production of 1 kg gain in calves fed A treatment was the most expensive (242 millim). However there were no differences in production costs between calves fed either B or C. treatment. It seems that the most economical feeding regimes for Friesian was that of the high concentrate rations. In the case of both buffalo and Native cattle the B treatment proved to be the best. Such high cost in A treatment may be explained by:

1. The higher prices of one kg starch equivalent obtained from roughage sources than that of the concentrates (under Egyptian conditions).

2. The lower performance (daily gain) exhibited by the A treatment calves which was reflected on the effeciency of feed conversion. This agreed with the data reported by El Hakim (1971).

Conclusions

It could be concluded from the results presented in this study that native cattle were the most effecient which could be fattened solely on roughage. It is for this reason that fattening on clover, which is traditionally practiced by the Egyptian farmer was mainly dependent on native cattle males.

Where concentrates are available, it could be included in fattening rations either at the rate of 50% for Native cattle and buffalo calves or at the rate of 80% for Friesian calves, governed by its economical use.

These results have shown clearly to what extent, the average daily increase in body weight may depend upon roughage concentrate raio in the ration. These differences in response among Native cattle, Friesian and buffaloes were determinated in the use of kind of ration in the case of fattening.

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« دراسة مقارنة لانتاج اللحم من عجول الماشية والجاموس »
أولا : تأثير نسبة الاعلاف الخشنة الى المركزة فى العلائق على معدلات النمو والكفاءة التحويلية لعجول الماشية المحلية والفريزيان والجاموس

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شبرا الخيمة .

أجريت التجربة على ثلاث مجاميع من العجول بكل منها ٦٠ رأسا من كل من الماشية المحلية من الفريزيان والجاموس لدراسة أثر ثلاثة مستويات من الأعلاف الخشنة الى المركزة (١ : صفر ، ١ : ١ ، ١ : ٤) على معدلات الزيادة فى الوزن وكفاءة تحويل الأغذية وذلك فى الفترة الوزنية بين ٢٠٠ كجم كوزن ابتدائى وحوالى ٣٢٥ كجم كوزن نهائى . وقد كان عدد كل من العجول البلدية والفريزيان والجاموس التى غذيت على علائق من المواد الخشنة فقط أو علائق بها ٥٠٪ مواد خشنة ، ٥٠٪ مواد مركزة هو ٢٢ رأسا . كان عدد العجول المغذاة على علائق غنية فى المواد المركزة هى ١٦ رأسا من كل من الفريزيان والبلدى والجاموس وقد أوضحت النتائج أن أقل معدلات زيادة يومية كانت تلك الخاصة بالفريزيان المغذى على اعلاف خشنة فقط تلتها معدلات الزيادة للجاموس ثم العجول البلدية فى نفس المعاملة الغذائية . وقد لوحظ أن زيادة نسبة المواد المركزة فى العليقة تبعه تحسن فى معدلات الزيادة فى الوزن كما تبع ذلك أيضا تحسن فى كفاءة تحويل الأغذية .