THE SUITABLE LEVEL FOR FEEDING DAIRY ANIMALS

I.—The Effect of Reducing the Maintenance Level for the Buffaloes and Local Cows

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SUMMARY

Two experiments were undertaken with oxen and two with female buffaloes, when being dry, to study the effect of reducing the maintenance requirments to a suitable practical level. In each experiment five animals were fed individually for 60 days on Ghoneim's standard, followed by 60 days on the reduced level which was 25% less than Ghoneim's standard in one case and 33% less in the other. With oxen fed on Ghoneim's level [0.58 kg starch value (S.V.)/100 kg. live weight (L.W.)], there was a significant increase in live weight of 8.44% in one case and 3.76% in the other. There was also a significant increase of 4.87% when using 25% reduction, but the L.W. was practically constant with 33% reduction (0.39 kg. S.V./100 kg. L.W.). With buffaloes on Ghoneim's level there was a significant increase of 9.22% and 7.87% in two cases. Feeding on 33% reduced level significantly decrease in the L.W. by 4.65% while with 25% reduction a slight significant increase in weight occured (2.26%), indicating that this level (0.39 kg./100 kg.L.W.) could be adopted for maintaining buffaloes. Therefore,both cows and buffaloes could be maintained on a level of 0.38- 0.39 kg.S.V./100 L.W. For practical feeding a level of 0.4 kg. S.V./100 L.W. could be used for maintenance for cows and buffaloes saving 31% of the present level for cows and 21% for buffaloes. In a year this would equal ca.300.000 Tons S.V. which costs 6 million pounds if taken from undecorticated cotton seed cake.

INTRODUCTION

Much work was undertaken by several workers to assess the energy requirements for maintenance. Particular attention was directed for dairy animals. The minimum requirements for maintenance is usually obtained from the basal metabolism. Mitchel (in ref.3) suggested an increase of 25 %to the basal metabolism to obtain maintenance requirements and allowing for animal activity, while Brody *et al* (2) suggested 100% increase. Some workers tried to obtain maintenance allowances from feeding trials by maintaining the live weight as possible on a known level for a certain period. Knott (in ref 3) suggested the following equations to estimate the food corresponding to the increase or loss in weight.

Pounds gained × 3.53 = T.D.N required for gain. Pounds lost × 2.73 = T.D.N equivalent to loss. As a result of the experiments of several workers (Armsloy and Fries, Cochran *et al*, Frobes and kriss et al, Bendict and Ritzman (in ref. 3) and Mollgard (4)the maintenance requirements for 1000 1b cow were beleived to be approximately 5.4 therms net energy for fattening (5.0 1b starch equivalent per day). For an animal of a similar weight Exkles(12)and Hills(11)by using live weight method adopted 6.5 1b T.D.N. But Heacker and N.R.C (in ref3) suggested higher requirement of 7.9 1b T.D.N. Brody and Procter (2) using algebric partition, adopted 8.2 1b T.D.N. They also mentioned that the digestible energy for maintenance is 2.4 times the basal energy metabolism. Breirem (1) found that the allowances of 2.45 kg.S.V. could maintain an animal weighing 500 kg. Huth (10) recorded the maintenance allowances for animals weighing 600-800 kg.to be 3.0-3.6 kg. of starch value. Watson (14) adopted 6.0 1b S.E./1000 1b L.W. Maynard and Loosli (3) reported for a 1000 1b cow an allowance of 8.0 1b of T.D.N. for maintenance. Kellner (11) found that a 500 Kg. oxen need 2.0-2.5 kg. S.V. and for safety he recommended 0.5 kg. S.V. more. In Egypt the recommendation for maintenance indicated by Ghoneim (5) are 510 gm. S.V/100 kg. L.W. in case of buffaloes and 580 gm.S.V/100 kg L.W.with cow. Therefore, from the previous review of literature it was realized that somewhat variable levels were recommended for maintenance of a standard cows (1000 1b) fluctuating from 4.00 1b S.V by Kellner up to 7.64 1b S.V recommended by the N.R.C. Kellner recommended for safety 2.5 kg. S.V per 500 kg animal (0.5 kg. S.V./100 kg.). This figure is practically similar to that recommended by Ghoneim for buffaloes (0.51 kg./100 kg.L.W.). But ca. 14% less than this recommendation for cows. It was also found that the figure obtained by Kellner for maintenance experimentally by balance method in Europe (0.4 kg.S.V/100 kg.L.W.) was ca 30% less than that recommended by Ghoneim for cows. Therefore, it was decided to test the effect of a reduction in Ghoneim, standard for Egyptian

local breeds so that the level would be quite approaching the 0.40 kg. S.V. figure by Kellner. It was decided to test two levels of reduction, 25 and 33 % less than Ghoneim. With buffaloes 25 and 33 % reduction on the buffaloes level recommended by Ghoneim were also experimentally examined. Several attempts have been tried at the Experiment Station of Animal Nutrition Faculty of Agriculture Giza to find out the proper level of feeding for growing cattle (7,8,9) and sheep (6). It was also found generally that normal growth was maintained by making a reduction in the food levels already applied. Following similar lines it was hopeful that under our climatic conditions a reduction in the level for maintaining cows and buffaloes might be successful in feeding practice without any harmful effect.

EXPERIMENTAL AND METHODS

Animals experimented on were 5 oxen and 10 femal buffaloes taken from the herd of Experiment Station of Animal Nutrition, Faculty of Agriculture Giza.

Four experiments were undertaken, two with each species using two reduced levels in each case. The control level was that of Ghoneim. The two reduced levels were75 and 67of the control ration, the reduction being 25 % in one experiment and 33 % in the second. In each experiment 5 animals were used. In each experiment the control period of 60 days using the control ration was followed by a tested period of 60 days with a reduced level. In the case of cows, experiments were performed with 5 oxen which were used in testing the two reduced levels; with buffaloes 10 female buffaloe were used, 5 in each experiment. This was intended for female buffaloes in order to avoid prolonging experimental period to give a chance for the animal to be served.

Feeding with oxen in experiment (25 % reduction) was on a food mixture and wheat straw along with a supplement of cod liver oil as a source of vitamin A, but in other 3 experiments (oxen 33 % reduction and buffaloes both 25 to 33 % reduction), clover hay was used alone for feeding The following Tables I and II indicate the calculated starch value in the four Experiments.

TABLE I.—**Feeding Chart for individual animals in Expt. 1 and 2.**

Expt.		Normal level						Reduced level					
		Weight	Feeding value		Feeding stuffs			Weight	Feeding value		Feeding stuffs		
			Starch value	Digestible protein	Wheat straw	Food mixture	Hay		Starch value	Digestible protein	Wheat straw	Food mixture	Hay
		kg.	kg.	gm.	kg.	kg.	kg,	kg.	kg.	gm.	kg.	kg.	kg,
Exp. 1 Reduction 25%	1	407	2.36	203·5	2.0	3.0	—	450	1.96	225.0	2.0	2.5	—
	2	368	2.13	184.0	2.0	2.7	—	404	1.76	202.0	2.0	2.2	—
	3	338	1.96	169.0	2.0	2.5	—	378	1.64	189.0	2.0	2.0	—
	4	397	2.30	198.5	2.0	3.0	—	430	1.87	215.0	2.0	2.3	—
	5	398	2.31	199.0	2.0	3.0	—	410	1.78	205.0	2.0	2.2	—
Exp. 2 Reduction 33%	1	458	2.66	229.0	—	—	8.80	474	1.83	237.0	—	—	6.1
	2	390	2.26	195.0	—	—	7.60	409	1.59	204.5	—	—	5.3
	3	372	2.16	186.0	—	—	7.20	392	1.52	196.0	—	—	5.1
	4	446	2.56	223.0	—	—	8.60	457	1.78	228.5	—	—	5.9
	5	424	2.46	212.0	—	—	8.20	435	1.69	217.5	—	—	5.6

TABLE II.—**Feeding chart for Individual Animals in Expt. 3 and 4**

Expt.		Normal level				Reduced level			
		weight	Feeding value		Feeding stuff	weight	Feeding value		Feeding stuff
			starch value	Digestible protein	hay		starch value	Digestible protein	hay
		kg.	kg.	gm.	kg.	kg.	kg.	gm.	kg,
Expt. 3	6	220	1.12	110.0	3.7	242	0.92	121.0	3.1
	7	251	1.28	115.5	4.3	278	1.07	139.0	3.6
	8	260	1.33	130.0	4.4	282	1.08	141.0	3.6
	9	250	1.28	125.0	4.3	272	1.04	136.0	3.5
	10	285	1.45	142.5	4.8	308	1.19	154.0	4.0
Expt. 4	11	320	1.63	160.0	5.4	345	1.18	172.5	3.9
	12	309	1.58	154.5	5.3	331	1.13	165.5	3.8
	13	326	1.66	163.0	5.5	355	1.21	177.5	4.0
	14	350	1.79	175.0	5.9	377	1.29	187.5	4.3
	15	357	1.82	178.5	6.1	385	1.31	192.5	4.4

RESULTS AND DISCUSSION

Experiment 1

The effect of a 25% reduction in the maintenance level of Ghoneim feeding oxen

Results in Table (3) indicated that animals receiving Ghoneim's recommendations for 60 days increased in live weight. The gainwas 43, 36, 40, 33 and 12 kg. respectively with the five animals having an average of 32.8 kg. The corresponding percentage gain was 10.56, 9.78, 10.58, 8.31 and 3.00; the average increase was 8.44 ± 0.449%. Statistical analysis showed that gain in weight was highly significant (calculated to = 18.78).

This indicates clearly that Ghoneim's standard appeared to be more than required for maintenance. Such level made the oxen to put weight and therefore would be for beyond the minimum maintenance requirements under our local condition.

TABLE 3.—**Effect of reducing the maintenance level on mature oxen feeding standardon 60 days on Ghoneim's level (A) followed by 60 days on a reduced level(B)**

	Item	Animal 1	2	3	4	5	Average
A = Ghoneim's 1.vel	Initial weight	407	368	338	397	398	381.6
	Weight at the end of the interval * 1	420	380	351	408	400	391.9
	2	431	392	362	416	405	401.2
	3	444	399	368	424	408	408.6
	4	450	404	378	430	410	414.4
	Average gain	43	36	40	33	12	32 8
	% gain	10.56	9.78	10.58	8.31	3.00	8.44± 0.449
B = Reduced level, 25% reduction from A	Initial weight	450	404	378	430	410	414.4
	Weight at the end of the interval * 1	457	411	384	436	414	420.4
	2	462	419	388	439	418	425.2
	3	469	426	393	444	422	430.8
	4	475	430	398	446	424	434.6
	Average gain	25	26	20	11	11	18.6
	% gain	5.56	6.41	5.29	3.70	3.41	4.87

* The interval = 15 days

This was confirmed from the feeding results when this level was reduced. After 25% reduction in the level, the animal continued to increase in live weight, the gain ranged between 11 and 26 kg. corresponding to a percentage gain ranging between 3.41 and 6.4. The average gain was 4.87 ± 0.571 % which was also significant (calculated t=8.53).

But here the percentage increase was lower than with the first period using the control level (without reduction).

The food here consisted of wheat straw and a certain food mixture.

Therefore, it was clear that Ghoneim's level appeared to be higher than economical maintenance requirements for our mature cows under our tropical or semi-tropical conditions.

As the animals before being put into experiment had been working somewhat heavily at the farm and might have lost weight particularly if the food was below their requirements, it was not surprizing to increase rapidly in weight after having a rest and being fed Ghoneim's level which was more than adequate.

A test of the effect of further reduction of Ghoneim's level was made in Experiment 2 in order to approach the minimum maintenance level.

But before starting it was wiser to give them longer rest and to feed them back on an adequate level to be sure that they were in good condition before starting the next Experiment. It was of our intrest to test the effect of reducing the level using a common used clover hay which is generally known to be a good food as basal ration for maintenance studies and in digestibility trials.

Before starting the next Experiment a prolonged transition period of 60 days would allow the animals to be accustomed to the new ration and to be in good condition.

Experiment 2

The effect of a 33% reduction in the maintenance level of Ghoneim feeding mature oxen

For more economy the success in Experiment 1 encouraged us to test a further 33% reduction in Ghoneim's level when feeding with clover hay.

At the start of the transition period using hay and the control level, the animals appetite was checked for a few days during which they lost some weight. Then they were able to consume the total daily offered food.

Results in Table 4 indicated that after the transition period, two animals (No. 4 and 5) resumed back their initial weight but 3 animals (No.1, 2, and 3) lost 17 to 40 kg.

During Expt. 2 the 5 animals started to increase in live weight from the 1*st* interval (3 to 8 kgs.), and other during the other successive interval the total gain in weight was found 11 to 20 kg. At the end of the period of control level the average being 15.4 kg. The average percentage of the gain was 3.76 ± 0.589 (2.46 up to 5.37%).

TABLE 4.—**Effect of reducing the maintenance level on mature oxen. Feeding 60 days on Ghoneim's level (A) followed by 60 days on a reduced level (B)**

	Item	Animal 1	2	3	4	5	Average
A = Ghoneim's level	Initial weight	458	390	372	446	424	418.0
	Weight at the end of the interval : 1	464	394	379	449	428	422.8
	2	468	398	384	453	430	426.6
	3	471	404	388	455	434	430.4
	4	474	409	392	457	435	433.4
	Average gain	16	19	20	11	11	15.4
	% gain	3.49	4.87	5.37	2.46	2.59	3.76
B = Reduced level 33 % Reduction from A	Inital weight	474	409	392	457	435	433.4
	Weight at the end of the interval : 1	472	408	393	455	438	433.2
	2	470	406	390	453	440	431.8
	3	472	407	391	457	439	433.2
	4	474	409	390	457	437	433.4
	Average gain	0.00	0.00	-2.00	0.00	+2.00	0.00
	% gain	0.00	0.00	-0.51	0.00	+0.46	0.00

The increase was significant (calculated t = 5.28).

These results confirmed those in Expt. 1 indicating that Ghoneim's level was more than adequate for maintaining mature oxen.

Results in Table 4 for the tested further reduction indicated that the animals were nearly constant in weight along the successive intervals of the experimental period. During the intervals the change in weight was not exceeding ± 2 kg. in four cases and 4 kg. in one case (Animal No. 4 interval 7).

At the end of 60 days the animals remained practically constant in weight. The percentage change in weight from initial was between —0.50 and +0.41 % the average being -0.02 % which was obviously not significant.

Therefore, such reduced level could be safety considered as minimum maintenance level.

This means that giving mature cows an amount of 0.39 kg.S.V. per 100 kg. live weight (0.58 × (100-33) /100) instead of the 0.58 kg. level per 100 kg. live weight recommended by Ghoneim, would satisfy maintenance requirements even during cold monthes of the year (December to February).

Applying notice formula with the data group of the control period of oxen having an average weight at the start of the period gained 15.4 kg. consuming 145.4 kg. starch value during this period. Therefore, a reduction in this ration to make it only for maintenance during this period* a deduction of 51.89 kg. S.V. (15.4 × 3.37).

Therefore, the animals should receive 145.40 - 51.89 = 93.51 kg. S.V. with a reduction of 35 %, the daily requirement would be $\frac{93.51}{60}$ = 1.56 kg. S.V. for the animal having an average weight of 418 kg.

Therefore the requirements for 100 kg. live weight would be $\frac{1.56 \times 100}{418} = 0.37$ kg. S.V.

This figure was practically the same as the level used in the treated period (0.58 × 67) = 0.39 kg. S.V. per 100 kg. live weight because the predicate reduction using Knott's equation (in ref 3) was by chance practically the same as the reduction intended.

By careful inspection of the published data on maintenances level, it would be seen that Brody (2) found that 3.53 lb T.D.N are required for basal metabolism for a 1000 lb cow. This would be equal to 0.32 kg. S.V. per 100 kg. live weight.

This figure could be considered the minimum for maintenance. Allowing 25 % more than the basal metabolism recommended by Mitchel (in ref 3), the maintenance requirements could be 0.4 S.V. per 100 kg. This figure agreed very well with that published by Kellner (11) for each 100 kg. live weight obtained by the balance method.

This figure is also in accordance with that experimentally produced here by the live weight method (0.39 S.V./100 kg. L.W.).

* Pounds gained × 3.53 = T.D.N required for gain
3.53 T.D.N × 0.955 = 3.37 S.V.

In practical feeding Kellner allowed 25% more for saftey recommending 0.5 kg S.V. per 100 kg. for cows under European Conditions.

Therefore, the practical recommendations given by Ghoneim for Egyptian cows (0.58 kg. S.V./100 kg. L.W.) would be 45% more than the lower level recommended by Kellner (0.40) and 16% more than the higher level (0.50).

In Egypt it seems that the lower limit of Kellner (0.40) appears to be suitable for our conditions being in harmony with the experimental results here.

It seems that not more than a 10% higher than this level (0.45 kg. S.V./100 kg. L.W.) could be recommended when food is plentiful and cheap. Such level would be 40% more than the basal metabolism requirements.

It seems that several standards recommended by several workers appeared to be much higher as those recommended by the N. R. C. Mollgard, Haecker and other (3.55–3.60 kg. T.D.N.) which ranged, between 0.526 up to 0.80 lb. T.D.N.

Experiment 3

The effect of 25% *reduction in the maintenance level of Ghoneim feeding mature buffaloes.*

Results in Table 5 indicated that the animals fed on Clover hay and receiving Ghoneim's recommendation for maintenance increased in live weight, the gain was 22, 27, 22, 22 and 23 kg. respectivly with an average of 23.2 kg. The corresponding percentage of the gain was 10.00, 10.75, 8.45, 8.80 and 8.07%, the average being 9.22 $\pm$ 0.502. This gain was significant (calculated t = 18.37).

But here the gain was less than that with cows receiving control level.

Therefore, Ghoneim standard for maintenance appeared to be more than adequate.

The reduction in Ghoneim standard by 25% did not check putting weight for the animals. The increase continued in the majority of cases in each interval. The average increase in weight during the whole period was 6.4 $\pm$ 0.433. Although the increase was significant (calculated t = 5.22), yet the increase was much less than with cows receiving 25% less of the ration. This may indicate that although the 25% reduction level was more than minimum maintenance, but it seems to be nearer to it than with the case of cows in Exp. 1. In other words the buffaloes were more affected by the reduction than with cows.

This was confirmed from the results of Expt. 4

TABLE 5.—**Effect of reducing the maintenance level on mature buffaloes. Feeding 60 day on Ghoneim's level (A) followed by 60 days on a reduced level (B)**

	Item	Animal 6	7	8	9	10	Average
A = Ghoneim's level	Initial weight	220	251	260	250	285	253.2
	Weight at the end of the interval : 1	224	257	265	256	287	257.8
	2	230	264	270	260	293	263.4
	3	235	270	274	268	300	269.4
	4	242	278	282	272	308	276.4
	Average gain	22	27	22	22	23	22.0
	% gain	10.00	10.75	8.45	8.80	8.07	9.22
B = Reduced level 25% Reduction from A	Initial weight	242	278	282	272	308	276.4
	Weight at the end of the interval : 1	244	280	283	274	312	278.6
	2	245	283	285	276	317	281.2
	3	246	284	285	278	319	282.4
	4	246	284	286	278	320	282.8
	Average gain	4	6	4	6	12	6.40
	% gain	1.65	2.15	1.42	2.20	3.89	2.26

Experiment 4

The effect of a 33% reduction in the maintenance level of Ghoneim feeding mature buffaloes

Results in Table 6 with the control period using Ghoneim's level were in accordance with these in Expt. 3, but here, the average absolute gain was 26.2 kg., being slightly higher yet, the average percentage gain was 7.87 ± 0.28, being slightly lower. This was due to the fact that the average initial weight of this group of Animals was higher than with Expt. 3. The increase was also significant (calculated t = 28.8) indicating the surplus in the food than requirements for maintenance.

TABLE 6.—**Effect of reducing the maintenance level on mature buffaloes. Feeding 60 days on Ghoneim's level (A) followed by 60 days on a reduced level (B)**

	Item 11	Animal	12	13	14	15	Average
A = Ghoneim's level	Initial weight	320	326	350	350	357	332.4
	Weight at the end of the interval : 1	327	315	334	357	362	339.0
	2	332	320	341	364	371	345.6
	3	340	325	347	370	379	352.2
	4	345	331	355	377	385	358.6
	Average gain	25	22	29	27	28	26.2
	% gain	7.80	7.12	8.89	7.71	7.84	8.87
B=Reduced level 33% Reduction from A	Initial weight	345	331	355	377	385	358.6
	Weight at the end of the interval 1	340	329	357	365	374	353.0
	2	336	328	354	354	367	347.8
	3	333	327	354	348	359	344.2
	4	330	326	352	344	355	341.4
	Average gain	-15	-5	-3	-33	-30	-17.2
	% gain	-4.34	-1.52	-0.84	-8.75	-7.79	-4.65

When the animals were put on the tested level with 33 % reduction, the five animals started to lose weight from the 1*st* interval, the loss being between 1 and 11 kg. The loss continued in weight in each animal during succeeding interval. At the end of the period the average loss was 17.2 kg. With wide variation. The percentage loss ranged between 8.75 and 1.52 being 4.65 ± 0.506. The loss was significant (t = 9.19).

Therefore, such reduced level of 33 % reduction from Ghoneim cannot be adopted because it failed to maintain the weight of the animal.

The reduced level was mostly below the minimum maintenance level. The results also indicated that the buffaloes were more affected by

the reduction than cows which were maintained by the level with 33% reduction than Ghoneim's.

As the gain at 25% reduction was 2.26% and the losses at 33% reduction was 4.65%, it seems that the reduction which would give the suitable minimum maintenance would be slightly more than 25% reduction in order to be the suitable maintenance which would keep the weiight constant, if we neglect the 2.26% increase in weight the 25% reduction - level could be considered suitable for maintaining the live weight constant. Therefore, the daily requirement per 100 kg. L.W. would be $(0.51 \times 7.5) = 0.38$ kg. S.V. as was used in Expt. 3 during the tested period.

From this results and discussion it would be clear that this experiment led to an important fact that the level of feeding that would keep mature cows or buffaloes constant in live weight is between 0.37 - 0.39 kg. S.V./ 100 kg. live weight. In other words, both species under our climatic conditions and during the period from october up to December including winter time could maintain their weight by feeding on a level of 0.38 kg. S.V./100 kg. live weight. Such results are in accordance with the success in reducing the feeding level for growing calves and sheep without impairing the growth (6,7,8,9) under our local conditions.

Therefore, it seems more siutable not to differentiate between cows and buffaloes in maintenance requirements per 100 kg. L.W.

As their average weights of both species are approaching one another.

In fact with the animals used in our Expt. 3 and 4 the average weight of the group was in fact less than that with oxen in Expt.1 and 2.

Therefore, a practical allowance of 0.40 kg. S.V. per 100 kg. L.W. would be a suitable level for maintaining both mature cows and buffaloes. Such level would be 25% more than the minimum requirements (0.32 kg. S.V. per 100 kg. L.W.).

In this connection Mitchel (in ref3) suggested 25% increase in the basal metabolism allowing for activity of the animal.

Such level (0.40 kg. S.V./100 kg. L.W.) when adopted forb oth cows and buffaloes, would save 21% and 31% of the maintenance present level used in Egypt for buffaloes and cows respectively.

Meantime, assuming an average weight of 400 kg. for the cow and 500 kg. for the buffaloe, the cow needs 850 kg. S. V. for maintenance per year while the buffaloe needs930kg. S.V. The experimentally produced level (0.40 kg. S.V./ 100 L.W.) would save 200 kg. S.V.

per buffaloes and 266 kg. S.V. per cow annually. This would save about 319, 600 tons starch value per year costing about 6,392,000 L.E. if the starch value were taken from undecorticated cotton seed cake (1 ton. S.V. from it = 20 L.E.).

REFERENCES

1. **Breirem, K.** (1948) Actual problems in milk production., *Landbrukologsk. Inst. Husdyrernoering Foringsloese Soeatrykk. (in Nutrit. Abst.* **18** No. 73 pp. 23, 1948).
2. **Brody, S. and Procter, R.C.** (1935) Growth and development with special reference to domestic animals. 35. Energectic efficiency of milk production and the influence of body weight. (*In Nutrit. Abst.* **5**. No. 2213, 1935 - 1936).
3. **Maynard, L. A. and Loosli, J.K.** (1947) Animal nutrition. *2nd Ed. Mc - Graw Hill Book Company, Inc. N. Y. and London.*
4. **Mollgard, H.** (1931) Grundzuge der Ernehrung - Sphysiologie der Haustier; *Paul Prey Berlin.*
5. **Ghoneim, A.** (1958) Animal Nutrition. *5th Ed. Anglo Egyptian Library, Cairo.* (In arabic).
6. **Ghoneim, A. M., Raafat, M., Abou - Raya, A.K. and Darwish, A.** (1960) Economic feeding of Egyptian sheep on rations with reduced level of starch value in relation to growth. Mededlingen der veertsenijcheol van de rijkuniversiteit van gent, 5e *Jaargang Nt* 2.
7. **Ghoneim, A., Raafat, M.A., Abou-Raya, A.K. and Abou-Hussein E.R.M.** (1957) Feeding of Egyptian cows and buffaloes on different levels of starch values. I. Economic food requirements for growing calves during the first six months of growth. *Faculty of Agriculture - Cairo University. Bull No.* **134.**
8. **Ghoneim, A., Raafat, M. A., Abou Raya, A. K., and Abou Hussein, E.R.M.** (1957) Egyptian cows and buffaloes on different levels of starch values. II. Economic food requirements for growing calves during the second six months of growth. *Faculty of Agriculture - Cairo University Bull. No.* **134.**
9. **Ghoneim, A., Raafat, M. A., Abou Raya, A. K. and Abou Hussein, E.R.M** (1957). Feeding of Egyptian cows and buffaloes on different levels of starch values. III. Economic food requirements for growing calves during the third six months of growth. *Faculty of Agriculture - Cairo University. Bull. No.* **135.**
10. **Huth, F. W.** (1955) Daily records of milk production and feed consumption for high yielding cows of Holstein Friesian breed in Mariensee. Ztschr Tiereszucht, **66**, 173 - 202. (*In Nutrit. Abst.* **26**, No. 3847 p. p. 812, 1956)
11. **Kellner, O.** (1926) The scientific feeding of Animals. *Second Edition, Authorised translation by William Goodwin Duckworth, London, W.C.*
12. **Thomas, J.** (1956) Nutrition and feeding of dairy cattle. *J. Dairy Sci.* **29**, 735.
13. **Snedecor, G.W.** (1948) Statistical methods. *4th . Edit. The Iowa State College Press.*
14. **Watson, S.J.** (1949) Feeding of Livestock. *Thomas Nelson and Sons Ltd. First Published.*

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المستوى الغذائى المناسب لحيوانات اللبن

١ ـ تأثير تخفيض العليقة الحافظة للجاموس والأبقار المحلية

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الملخص

أجريت تجربتان على ثيران البقر وأخريان على اناث الجاموس الجافة لمعرفة تأثير تخفيض المستوى الغذائى للعليقة الحافظة ، وفى كل تجربة غذيت خمسة حيوانات فرديا لمدة ٦٠ يوما على المستوى الحالى **لغنيم** ، يعقبها ٦٠ يوما أخرى على المستوى المنخفض ، واختبر مستويان للتخفيض هما ٢٥٪ فى التجربة الأولى و ٣٣٪ فى الثانية . وفى حالة الثيران حدثت زيادة مؤكدة عند التغذية على المستوى العادى (٠٫٥٨ كجم معادل نشا لكل ١٠٠ كجم وزن حى) كلفت ٤٤٫٨٪ فى التجربة الأولى ، ٧٦٫٣٪ فى التجربة الثانية كما حدثت زيادة مؤكدة تبلغ ٨٧٫٤ عند التغذية على المستوى المنخفض ٢٥٪ بينما ثبت الوزن عند استخدام التخفيض ٣٣٪ ، من ذلك يتضح أن التغذية على مستوى يبلغ ٠٫٣٩ كجم معادل نشا / ١٠٠ كجم وزن حى تكفى لحفظ الوزن فى لبقر .

وفى حالة الجاموس حدثت زيادة مؤكدة عند استخدام المستوى العادى (٠٫٥١ كجم معادل نشا لكل ١٠٠ كجم وزن حى) بلغت ٢٢٫٩٪ فى التجربة الأولى، ٨٧٫٧٪ فى الثانية ، وحدثت زيادة مؤكدة تبلغ ٢٦٫٢٪ فى حالة التغذية على المستوى المنخفض الى ٢٥٪ بينما حدث نقص مؤكد فى الوزن بلغ ٤٫٦٥٪ عند التخفيض ٣٣٪ . وهذا يدل على أن هذا المستوى دون العليقة الحافظة ، ومن الناحية العملية فان تخفيض ٢٥٪ فى الجاموس (تعادل مستوى غذائى ٠٫٣٨ كجم معادل نشا لكل ١٠٠ كجم وزن حى) يعتبر مستوى مناسب لحفظ وزن الحيوان ، وبذلك يبدو بصفة واضحة أن كلا البقر والجاموس يلزمهما مستوى واحد لكل ١٠٠ كجم وزن حى يبلغ ٠٫٣٨ ـ ٠٫٣٩ كجم معادل نشا ، وهذا المعدل يساوى عمليا المستوى ٠٫٤٠ الذى وجده **كلنر** مناسبا كعليقة حافظة للثيران مستخدما ميزانى الآزوت والكربون . وعلى ذلك فلا داعى لزيادة العليقة الحافظة للبقر والجاموس فى مصر عن هذا الحد ، وهذا يوفر ٣١٪ من العليقة الحافظة للبقر و ٢١٪ فى حالة الجاموس مما يوفر سنويا نحو ٣٠٠ ألف طن معادل نشا يبلغ قيمتها نحو ٦ مليون جنيه اذا أخذت من كسب قطن غير مقشور . فلا ننصح بزيادة هذا المستوى لأكثر من ١٠٪ ليصبح ٠٫٤٤ كجم معادل نشا لكل ١٠٠ كجم وزن حى فى حالة توفر الغذاء ورخص ثمنه .