SHORT FEED SYSTEM FOR FATTENING BEEF CALVES ON DRY FEEDS AT DIFFERENT SEASONS

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SUMMARY AND CONCLUSIONS

Series of short feeding trials were carried out in a two-year programme (June, 59–May, 61). Almost 240 selected one-year old steer calves of 200-kg· liveweight were employed ; about 40 calves in each 4-months trial. A gain of 100 kg. of body weight was the factor limiting the feeding period. The cattle were, equally, fully-fed dry feeds consisting mainly of cottonseed oil cake, wheat bran and wheat straw. Radicel and CO-OP feed mix were used in some of these trials. Vitamin A and D, in the form of cod liver oil, were mouth-fed occasionally.

Body gains, starch E, T.D.N. and digestible protein per kg. body gain ; feed, feed cost per 100 kg. gain and net return per head above cost were determined. Data obtained seem to justify the following conclusions :

(1) A short feed system of fattening young beef steers on dry feeds proved possible 3 times a year, thus providing 3 crops of moderately fattened steers and overcoming the difficulty of delayed profit and the hazard of extended dry feeding periods.

(2) Seasonal variations in rate of body increase and hence of feed efficiency and cost were demonstrable. Average rates of body increase of calves on full-feed were : 0.96, 0.87 and 0.80 kg./day in Jun-Sep., Oct.-Jan., and Feb.-May, feeding periods, respectively.

(3) Amounts of feeds, kg. Starch E. per Kg. wt. gain and feed costs were in the decreasing order, and net returns per head, in the increasing order of growth rates, averaging 3.94, 4.43 and 4.78 kg. Starch E. and 7.55, 5.50 and 3.35 £ net return.

INTRODUCTION

Cattle are usually fed for one or more of the following reasons : (1) to obtain more than current prices for some farm-grown crops; (2) to market roughage and pasture at a profit and (3) to maintain and improve the fertility of the soil.

These reasons may be combined by saying that cattle are fed to obtain the highest net return from farm-grown feeds. This statement implies that cattle are fattened principally on feeds grown on the farm where the cattle are fed. This is largely true, although there are

many feeders who buy most or nearly all their feeds and who may even lease the ground on which their feed lots are located. Such men feed cattle for the same reason that others operate factories, namely, to make profit by combining raw materials, which are of little value in their natural form, into a product for which there is a strong demand and which, therefore, can be sold for a higher price than the cost of the raw material.

Strange as it may be seen, the diversified livestock farming of Egypt depends, in considerable measure, for its success, upon a single-crop or a single-feed system. Clover (Berseem) is the dominant green fodder and cotton seed oil cake is the main concentrate for cattle feeding.

Although raising beef cattle in Egypt was carried on most extensively in the big farms, where vast areas cultivated with clover were available, it was by no means confined to such farms. As the farms, due to the land reform system, became of limited areas, and as more acreages are increasingly devoted to fruit orchards and vegetable crops accordingly, fattening beef cattle mainly on green clover is becoming of decreased importance. Small farmers, however, still depend almost entirely on clover for raising their individual farmborn calves ; such calves are usually marketed at the end of the green season. Dry and semi - dry feeding are, seemingly, becoming of special importance.

One of the drawbacks of fattening cattle as an investment is the tying of the capital in cattle and feed for a longer period, particularly in long feed systems. The milk producer, for instance, is previledged by weekly payment whereas the beef producer may wait for several months or even a whole year without any return. Moreover, the susceptibility to the incidence of cattle ailments or unfavourable conditions is greater on extended periods of feeding especially on dry lots. Short-feed system seems to be, therefore, of interest ; in fact a feeding programme of monthly return is in mind.

By short feed system we mean a feeding period under 120 days during which grown calves of one year old or 200 kilograms body weight are fed on dry lots a full feed. Such system would allow marketing three crops of moderately fattened beeves per year and would overcome the difficulty of delayed profit.

Perhaps the daily intakes in the full-feed system may sound unnecessarily high compared to the low allowances recomended by Ghoneim, Raafat and associates (1959) who always look for the least but economical levels of feeding at the different stages of growth (1956,59). Our full-feed conception was based on results of extensive work carried out in the University of Illinois Agricultural Experimental Station (Bull. 172 and 197) which showed that "rations

slightly above maintenance were less efficient for producing gains than larger rations, and that little or no difference was found in the efficiency of the full-feed, two thirds feed and one-third feed (above maintenance) rations for the production of gains. Although the larger rations furnished more feed over and above the maintenance requirement, this advantage was offset by the lower digestibility of the heavier rations.

EXPERIMENTAL

Series of short feeding trials were carried out in a two - year programme (June 1959 - May 1961). In each trial 40 to 50 beef calves averaging approximately one year of age and 200 kg . of body weight were employed. They were bought from the local markets and were carefully selected to be wide-framed, compact and of pronounced beef type. Health conditions eating abilities and appetites, feeding habits, growth rates and the general thrift of the animals were carefully examined in a week period and inferior calves were discarded and replaced by prime ones. The calves were fed dry rations throughout a feeding period the length of which was determined by a gain of 100 Kilograms of live weight. The achievement of three feeding trials per yare proved possible.

The composition of the rations and the daily allotments are given in Tables 1 and 2. In the first year programme the rations consisted of undecorticated cotton seed oil cakes, wheat bran and wheat straw. Due to its lower price and higher nutritive value, radicel (a brewery by-product composed of roasted rootlets of germinated barley seeds) was administered instead of wheat bran in the course of the second year schedule. Co-op manufactured feed mix (composed of C.S.O.C., 62%; wheat bran, 14 %; rice polish, 16%; molasse, 5%; ground limes tone, 2% ; and salt, 1%) was also used in the last test. Cod liver oil (Lysi) was mouthfed occasionally to supply vitamins A and D.

The animals were individually and equally fed three times a day. Feed lots for all the animals were weighed once a week and daily allotments for individual calves were estimated by weighing a standartd measure. It was intended in these studies to feed adequate rations, without throwing the animal off feed, in order to attain the highest gain in a reasonably short period. Animals were brought to water three times a day and were weighed monthly. They were sold on the fasting weight basis (12 hr. of fasting or 12 Kg. discount).

TABLE I.—**Gains, feed Consumption and Feed Costs of Fattened Beef Calves at Different Seasons**

	June 5-Sep. 14 1959	Sep. 20-Jan. 11 1959	Jan. 17-May 16 1960
Number of Animals	40	36	34
Days fed	102	114	121
Av. initial wt., kg.	184	189	205
Av. final wt., kg.	284	291	304
Av. total gain, kg.	100	102	99
Av. daily gain, kg.	0.98	0.89	0.82
% gain (gain ÷ initial wt.)	54.35	53.97	48.29
Av. daily ration :			
Undec. C. S. O. C.	5.50	5.00	4.50
Wheat bran	—	1.00	1.50
Wheat straw	3.00	3.00	3.00
Starch E. of daily ration	3.82	4.00	3.97
T. D. N. of daily ration	4.46	4.74	4.71
Starch E./kg. wt. gain	3.90	4.50	4.86
T. D. N./kg. wt. gain	4.55	5.33	5.75
Dig. Protein/kg. wt. gain	0.93	1.05	1.03
Feed per 100 kg. gain :			
Undec. C. S. O. C.	560	561	549
Wheat bran	—	112	183
Wheat straw	310	337	366
Feed cost/100 kg.. gain £	7.47	9.08	10.07
Initial price per 100 kg. B.w. £	17.00	17.50	18.00
Selling price per 100 kg. B.w. £	16.40	16.50	16.40
Return above feed cost/head £	7.83	5.68	3.00

TABLE II.—Gains, Feed Consumption and Feed Costs of Fattened Beef Calves at Different Seasons

	May 27-Sep. 12 1960	Sep. 22-Jan. 15 1960	Jan. 26-May 30 1961
Number of calves	50	42	38
Days fed	109	116	125
Av. initial wt., Kg.	198	192	183
Av. final wt., Kg.	301	292	280.5
Av. total gain, Kg.	103	100	97.5
Av. daily gain, Kg.	0.94	0.86	0.78
% gain (gain ÷ initial wt.)	52.03	52.90	53.27
Av. daily ration :			
Undec. C. S. O. C.	4.50	4.50	—
Radicel	1.00	1.00	—
Co-op Feed Mix	—	—	5.50
Wheat straw	3.00	3.00	3.00
Starch E. of daily ration	3.75	3.75	3.67
T. D. N. of daily ration	4.49	4.49	4.43
Starch E./Kg. wt. gain	3.99	4.36	4.71
T. D. N./Kg. wt. gain	4.78	5.23	5.68
Dig. protein/Kg. wt. gain	1.01	1.11	0.96
Feed per 100 kg. gain :			
Undec. C. S. O. C.	478	523	—
Radicel	106	116	—
Co-op feed mix	—	—	705
Wheat straw	319	349	385
Feed cost/100 kg. gain £.	7.75	8.48	9.36
Initial price/100 kg B.W. £	17.00	17.50	18.00
Selling price/100 kg B.W. £	16.25	16.40	16.40
Return over feed cost/head £	7.27	5.31	3.70

RESULTS AND DISSCUSSION

In table 1 and 2 are summarized the results of these feeding trials. Number of calves, periods of feeding, daily rations, average live-weights and body gains are presented. Nutritive values of feeds expressed as starch values, digestible protein and T D N are also shown. Calculations ot these values were based on Ghoneim's (1950) analysis of local feeding stuffs. Cost of unit of live-weight gain in terms of starch units, T D N and digestible protein, feed cost per 100 kg. gain and net return above feed cost are given. Perhaps a concise summary of the average data obtained in the two year programme as presented in the mentioned tables may be of useful interest. This summary is shown in table 3.

TABLE 3.—**Average Retas of Gain, Feed Efficiencies, Feed Conversions, Feed Costs and Net Returns in Fattening Beeves.**

	Jun. - Sep. trial	Oct. - Jan. trial	Feb. - May trial	Average all triale
Rate of daily gain, Kg	0.96	0.87	0.80	0.88
Starch E/Kg. gain, Kg	3.94	4.43	4.78	4.88
T D N/Kg. gain, Kg	4.66	5.28	5.66	5.20
Air-dry Feed/Kg. gain, Kg	8.86	9.99	10.94	9.93
Feed cost per 100 kg. gain, £ * . . .	7.61	8.78	9.72	8.70
Return over feed cost/head £	7.55	5.50	3.35	5.47

* £ = Livre Egyptian L.E. : = Egyptian Pound.

Rate of Body Gain

Inspection of the figures in table 3 indicates that very satisfactory gains were generally secured at the different seasons on dry feed by applying the full-feed system. An average daily gain as high as 0.96 Kg. was obtained in the Jun.—Sep. trials and a general average of 0.88 Kg. in all trials. Such averages are considerably higher than the values reported by Ghoneim (1950), namely 0.79 Kg. and maximum values recently reported by Ghoneim, Raafat and associates (1959) namely 0.732 Kg. The good-choice local calves fattened immediately after the green season (Jun.—Sep. trial) secured on average daily gain quite comparable with gains of some foreign breeds. Daily gains of calves of different foreign breeds, of the same weight as of the experimental calves, fattened on cotton seed oil meal as the main concentrate reported to be : 1.07 Kg. (Illinois Exp. Sta. 26, 27), 0.97 Kg. (Colorado Exp. Sta. 50), 0.96 Kg. (Nebraska Exp. Sta. 10, 20) and 0.87 kg. (Ohio Bull. 140), however, sudh gains were obtained on ordinary feeding and not on full-feed.

Feed Efficiency

The feed efficiency values expressed as Starch Equivalent units and T. D. N. units per unit gain (growth measures) were, on the average of all trials, 4.38 and 5.20 Kg. respectively. It is noticeable that the highest feed efficiency (av. 3.94 Kg. Starch E/Kg. gain) was demonstrated on calves fattened after the clover season (Jun. - Sep. period) and the lowest efficiency (4.78 Kg. Starch E. per Kg. gain) was observed in the last feeding period (Feb. - May).

The average Starch E/Kg. gain observed in this work was, in general, lower than the values reported by Ghoneim (1950) namely, 5.0 Kg. Starch E/Kg. gain, but was higher than that reported recently by Ghoneim and associates (1959) namely, 3.35 Kg. Starch E/Kg. gain, although the last value was based on selected few data.

The cost of kilogram gain in terms of T. D. N. observed in this work (5.20 Kg.) was higher than comparable values obtained on foreign breeds. Colorado Experimental station (1950), for instance, reported a value of 4.79 Kg. TDN/Kg. gain. The American National Research Council, Food and Nutrition Board, standards (1950) call for 5.27 Kg. TDN/Kg. gain for beeves of 273 Kg. weight, whereas the recent standards (1958) call for lower values, namely 4.9 Kg. It should be noted that the N.R.C. allowances of 1950 were, in general, set higher than average determined requirements to provide a margin of safety. In 1953, the Committee on Animal Nutrition decided not to include such margins in the future recommendations but to set forth intakes considered adequate for normal growth, health and reproduction, based on the average needs of groups of animals to achieve these results.

Food Conversion

The average feed conversion values expressed as air-dry feed per kilogram gain were on the average 9.9 kg.; 35% of which was roughage (wheat straw), and 53% as TDN. This value is considerably higher than the values recommended by the American N.R.C., namely 7.2 kg. feed (containing 68% TDN) per kilogram gain for a 273-kg. calf (2.7% of liveweight).

The air-dry feeds recommended by Ghoneim and associates (1959) for fattening 1 - 1½ year-old calves (3-4 kg./head) seem to be physiologically inadequate.

Feed Costs and Return

Feed cost per 100 kg. of body gain were, generally, in a decreasing order with the growth rates, the higher the rate of gain, the lower is the cost and contrary. The most economical costs were 7.61 £ and resulted in June-Sept. fattening period and the least economical being 9.72 £ were obtained in Feb.-May period. The average cost per 100kg. gain in all trials was 8.70 Egyptian pounds.

Net return values above feed cost per head were, naturally, in opposite direction with costs. Best return of 7.55 £ was obtained in first period and least return of 3.35 £ in the last period of fattening. The average net return above feed cost per head, in all trials, was 5.47 £.

Seasonal Variation

Seasonal variations in growth rates, feed consumption, cost of gain and return were very demonstrable. While an average daily gain of almost one kilogram was secured in the period just following the clover season, only a gain of 0.80 kg. were obtained the Feb. May period. Net returns were in accord with gain rates throughout the different seasons of fattening.

The results were quite in accord with what we should anticipate. The calves employed in June-Sept. feeding period were selected from those usually marketed after a long season of green legumenous feed (clover) and were, therefore, very healthy and thrifty. They responded perfectly well to dry feeding. Calves employed in successive periods were expected to be rather depleted of stored carotenes, vitamins and other dietary constituents ordinarily stored after long and liberal feeding of fresh and rich green clover. Moreover, the rate of body increase in beef cattle is generally retarded during the cold season, consequently, more feeds are required for the production of a unit of gain ; part of the ration is oxidized to keep the animal warm.

The incidence of cattle ailments and diseases was also seasonal. During the course of this work 10% of the calves fattened in the second and third periods, but none in the first period, developed certain disease of unknown origin characterized by stiffened fore limbs and knees, lameness, lack of appetite and considerable loss of weight. It was first diagnosed as vitamin A deficiency but excessive doses of cod liver oil failed to cure it. Symptomized treatment as rubbing legs with oil of terpentine, giving light doses of magnesium sulfates and transferring the animal to green feed ameliorated the disease but did not cure it. Such calves were sold with sacrified prices and their data were discarded.

REFERENCES

1. **Colorado Agricultural Experimental Station** (1950). *Memeograph Report, November*

2. **Ghoneim, A.** (1950).—Animal Nutrition. *3rd Edition, El-Olcum Press Cairo.*

3. **Ghoneim, A. Raafat, M.A., Abou-Raya, A.K., and Abou-Hussein, E.R.M.** (1956). Feeding of Egyptian cows and buffaloes on different levels of starch values. I.Economic food requirements for growing calves during the suckling period. *Cairo University, Faculty of Agric., Bull. No.* **94.**

4. **Ghoneim, A., Raafat, M.A., Abou-Raya, A.K. and Abou-Hussein, E.R.M.** (1959). Feeding of Egyptian cows and buffaloes on different levels of starch values. II. Economic food requirements for growing calves during the second six months of growth. *Cairo University, Faculty of Agric. Bull. No.* **134.**

5. **Ghoneim A., Raafat, M.A., Abou-Raya, A.K. and Abou-Hussein, E.R.M.** (1959). Feeding Egyptian cows and buffaloes on different levels of starch values. III. Economic food requirements for growing calves during the third six months of growth. *Cairo University, Faculty of Agric. Bull. No.* **135.**

6. *Illionis Agric. Expt. Sta. Bull. No.* **172.** (1914).

7. *Illionis Agric. Expt, Sta. Bull. No.* **197.** (1917).

8. *Illionis Agric. Expt. Sta. Memeograph Report.* (1926–1927).

9. *National Research Council.* (1950). Recommended nutrient allowances for beef cattle.

10. *National Research Council.* (1958). Report on nutrient requirement for beef cattle.

11. *Nebraska Bulletin No.* **116**, (1910).

12. *Nebraska Bulletin No.* **132**, (1912).

13. *Ohio-Bimonthly Bull. No.* **140.**

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نظام التغذية القصيرة المـدة فى تسمين العجول البقرى على العلائق الجافة فى مختلف الفصول

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المـلخص

فى بحث استغرق عامين (يونية ٥٩ ـ مايو سنة ١٩٦١) أجريت سلسلة تجارب على التغذية القصيرة المـدة فى تسمين العجول البقرى على الطلائق الجافة . استخدم فى هذا البحث نحو ٢٤٠ عجلا متوسط أعمارها نحو سنة ومتوسـط أوزانها ٢٠٠ كجم . وفى كل تجربة مدتها ٤ شهور تقريبا كان يستخدم نحو ٤٠ عجلا وكانت زيادة الوزن بمقدار ١٠٠ كجم هى العامل المحـدد لمـدة التجربة . كانت جميع العجول تغذى فرديا على كميات متساوية وكافية من العلائق الجافة المكونة أساسا من كسب بذرة القطن غير المقشور ونخالة وتبن القمح وفى بعض التجارب كان يستخدم مخلوط علف التعاون والراديسيل وكان فيتامين أ ، د فى صورة زيت كبد الحوت يعطى من آن لآخر بواسطة الفم .

أجرى تقدير للزيادة فى وزن الجسم ، معادل النشا ، والمواد الغذائية الكلية المهضومة ، والبروتين المهضوم الذى لزم لكل ١ كجم من الزيادة فى الوزن ، كما قدرت كمية الغذاء وتكاليفه بالنسبة لكل ١٠٠ كجم من الزيادة فى الوزن وكذلك العائد من التسمين فى كل موسم .

استخلص من نتائج هذا البحث ما يلى :

١ ـ أمكن الحصول على ثلاث عروات من العجول البقرى المسمنة تسمينا معتدلا فى العام الواحد مع تحقيق عائد معتدل فى كل عروة وبذلك أمكن التغلب على عقبة تأخير العائد فى حالة التسمين الطويل المـدة .

٢ ـ كان تأثير فصول السنة على معدلات النمو وكفاءة تحويل الأغذية وتكاليف التسمين واضحا ، فكانت معدلات النمو على التغذية الكاملة كالآتى : ٩٦ر٠ ، ٨٧ر٠ ، ٨٠ر٠ كجم فى الفترات فى اليوم يونية ـ سبتمبر ، أكتوبر ـ يناير ، فبراير ـ مايو على التوالى .

٣ ـ كانت كمية الغذاء الجاف ، معادل النشا لكل كيلو جرام واحد زيادة فى الوزن تتناسب عكسيا مع معدلات النمو وكان العائد الصافى يتناسب طرديا مع معدلات النمو فمعدلات النشـا كانت ٣ر٩٤ ، ٣ر٤٣ ، ٤ر٧٨ كجم والعائد الصافى كان ٧ر٥٥ ، ٥ر٥٠ ، ٣ر٣٥ جنيه للرأس الواحد على معدلات النمو السابق ذكرها فى (٢) على التوالى .