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CHICKEN LITTER IN FATTENING RATIONS FOR CATTLE AND SHEEP

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OPSOMMING: KUIKENHOKMIS IN VETMESTINGSRANTSOENE VIR BEESTE EN SKAPE.

Speenkalwers is in groepe gevoer en speenlammers is individueel gevoer op standaard vetmestingsrantsoene (Behandeling 1) vergeleke met rantsoene wat 20 % (Behandeling 2) en 40 % kuikenhokmis (Behandeling 3) bevat het. By speenkalwers was die verskil in daaglikse wins in liggaamsmassa hoogsbetekenisvol ($P < 0,01$) tussen Behandeling 1 en Behandeling 3 en betekenisvol ($P < 0,05$) tussen Behandeling 2 en Behandeling 3. In die geval van speenlammers was daar geen betekenisvolle verskille tussen behandelings beide in voerinname en daaglikse wins in liggaamsmassa nie. By speenkalwers is swakker vetbedekking en swakker gradering van die karkasse van Behandeling 3 vasgestel. Geen statistiese beduidende verskille in karkasdata tussen behandelings kon by die speenlammers vasgestel word nie. Beide by die speenkalwers en die speenlammers was die rantsoene wat 20 % kuikenhokmis bevat het die winsgewendste.

SUMMARY:

Weaner calves were group-fed and weaner lambs were individually fed on control standard fattening rations (Treatment 1) and compared with rations containing 20 % chicken litter (Treatment 2) and 40 % chicken litter (Treatment 3). With weaner calves the difference between treatments in daily gain in live mass between Treatment 1 and Treatment 3 was highly significant ($P < 0,01$) and it was significant ($P < 0,05$) between Treatment 2 and Treatment 3. In the case of the weaner lambs there were no significant differences between treatments both in feed intake and in daily gain in body mass. With weaner calves less fat covering and lower grading of the carcasses were obtained in Treatment 3. No statistical significant differences were established between treatments in the weaner lamb carcasses. In rations for both weaner calves and weaner lambs the level of 20 % chicken litter proved to be the most profitable.

Sheep and cattle fattening rations containing poultry litter were studied by Cuevas (1969), Jereoch, Hennig, Weber & Helwig (1969), Nakladal, Placek & Braun (1969), Parigi-Bini (1969) and Kumanov, Paliev & Jankov (1970). A review on the feeding of poultry litter in South Africa was published by Bishop, Wilke, Nash, Nell, MacDonald, Compaan, Grobler & Kingman (1971[a,b.]). Dehydrated poultry waste in rations for dairy cows received the attention of Thomas Tinnimit & Zindel (1972), while the use of poultry litter in drought rations for weaner sheep was investigated by Mc Innes, Austin & Jenkins (1968). Preston & Willis (1970), came to the conclusion that broiler house litter and poultry waste are variable commodities, but their inclusion may reduce the palatability and intake of rations. Evidence of toxic effects due to the addition of copper in poultry rations, when excreta were fed to sheep was obtained by Fontenot, Webb, Libke & Beuler (1971). No odour or taste effects in beef from steers fed a ration containing 25% dried poultry house litter could be obtained by Rhodes (1971).

The incorporation of chicken litter in fattening rations for cattle or sheep may be considered for the following reasons:

(a) At the present ruling price of R10 to R12 per tonne it is a comparatively cheap source of energy.

(b) Protein-rich feeds are in short supply, v.d. Merwe, (1967) and chicken litter can be considered as a substitute.

The object of the present study was to establish to what extent chicken litter can be incorporated into rumenant rations.

Procedure

Three groups of weaner calves, aged 7 months, each consisting of 5 Shorthorns and 2 Aberdeen Angus, were allocated to the three treatments as indicated in Table 1A. Likewise 3 groups of 12 Dohne Merino weaner lambs aged 8-13 months, were allocated to the treatments shown in Table 1B. The figures for crude protein, crude fibre and total digestible nutrients given in Tables 1A and 1B were calculated values.

Table 1A

Composition of weaner calf rations (%)

Constituents	Treatment 1	2	3
Maize meal	60	55	50
Lucerne hay	39	24	9
Chicken litter	–	20	40
Ground limestone	1	1	1
Percentage crude protein	13,9	13,9	15,0
Percentage crude fibre	14,1	12,7	12,8
Percentage total digestible nutrients	69,1	67,5	65,7

Table 1B

Composition of weaner lamb rations (%)

Maize meal	60	60	55
Chicken litter	–	20	40
Fish meal	6	4,5	5
Eragrostis curvula hay	10	15	–
Lucerne hay	24	–	–
Urea	–	0,5	–
Percentage crude protein	14,0	13,7	14,1
Percentage crude fibre	12,0	11,9	11,0
Percentage total digestible nutrients	70,3	70,0	69,5

The weaner calves were group-fed while the weaner lambs were individually fed. Daily feed intakes were recorded. The weaner calves were slaughtered at the stage when they were considered to have reached the super A grade. The weaner lambs were slaughtered at the grade 1 or better grade. Carcass data and grading were recorded after 24 hr chilling for the sheep and after 72 hr for the cattle.

Results

A. Weaner calves

Feed intake

The details of feed intake are presented in Table 2. The highest daily feed intake was achieved in Treatment 1 and this group reached the desired stage of finish within the shortest time. In contrast,the daily feed intake was lowest in Treatment 3 and this group took the longest time to reach the finished stage.

Table 2

Mean Feed Intake of weaner calves

Treatment	Total feed intake (kg)	Days fed	Mean daily intake (kg)	Intake relative to Treatment 1
1 – Control ration	725,6	90	8,06	100
2 – 20% Chicken litter in ration	801,4	104	7,71	96
3 – 40% Chicken litter in ration	909,1	132	6,89	85

Growth and feed conversion

The details of growth are given in Table 3. Feed conversion is expressed in terms of feed consumption per unit gain in body mass.

Table 3

Growth and feed conversion

Treatment	Initial Body mass (kg)	Final Body mass (kg)	Increase (kg)	Average daily gain (kg)	Feed Conversion
1	200,0	310,4	110,4	1,161	6,48
2	200,0	316,1	116,1	1,117	6,89
3	198,0	315,9	117,9	0,900	7,71

Slaughter data

The slaughter data are summarised in Table 4. No statistical significant differences were found between treatments in respect of mass of carcass, dressing percentage and *M. longissimus dorsi* measurements A and C ($P = 0,05$). However, significant differences, were established between treatments in *M. longissimus dorsi* measurement B and rib fat thickness (J). The differences in *M. longissimus dorsi* B measurements were highly significant ($P < 0,01$) between Treatments 1 and 2, significant ($P < 0,05$) between Treatments 1 and 3 and non-significant ($P < 0,05$) between Treatments 2 and 3. In rib fat thickness, the difference between Treatments 2 and 3 was highly significant ($P < 0,01$).

B. Weaner lambs

Feed intake

The mean daily feed intake per head and the total feed consumed is shown in Table 5. All sheep were slaughtered after seven weeks. Statistical analysis revealed no significant differences in feed intake between treatments

Growth and feed conversion

The details of increase in body mass and feed conversion are presented in Table 6. The data in Table 6 show a decreased daily gain in Treatment 3. The differences between treatments were, however, statistically non-significant. Feed conversion favours the control treatment but these differences were also statistically non-significant ($P = 0,05$).

According to the above data the highest daily gain and the most favourable feed conversion were obtained in Treatment 1. The difference in average daily gain between Treatment 1 and Treatment 3 is highly significant ($P < 0,01$), the difference between Treatment 2 and Treatment 3 is significant ($P < 0,05$), while the difference between Treatment 1 and Treatment 2 is non-significant ($P = 0,05$).

Table 4

Slaughter data of weaner calves

Treatment	Mass before slaughter (kg)	Carcass mass (kg)	Dressing %	Points for grade*	M.L. dorsi measurements (cm)			Rib fat (J) (cm)
					A	B	C	
1	310,4	172,0	55,4	1,0	10,93	5,87	0,94	0,89
2	316,1	177,3	57,5	1,0	10,86	5,24	0,94	1,09
3	315,9	178,0	56,3	1,86	11,17	5,40	0,80	0,50

* Points awarded: Super A = 1, Prime B = 2 and Grade 1A = 3

Table 5

Mean feed intake (kg) of weaner lambs

Treatment	Daily feed intake for consecutive weeks							Total feed intake per group
	1	2	3	4	5	6	7	
1 – Control ration	1,59	1,62	1,69	1,73	1,79	1,80	1,56	989,5
2 – 20% Chicken litter	1,70	1,49	1,74	1,84	1,97	1,80	1,66	1 024,3
3 – 40% Chicken litter	1,66	1,80	1,85	1,70	1,65	1,69	1,58	1 002,2

Table 6

Growth and feed conversion of weaner lambs

Treatment	Initial body mass (kg)	Final body mass (kg)	Gain (kg)	Average daily gain (gm)	Feed Conversion
1	32,8	42,3	9,5	198	8,68
2	33,2	42,5	9,3	194	9,15
3	34,0	41,2	7,2	150	11,59

Table 7

Slaughter data of lambs

Treatment	Body mass (kg)	Carcass mass (kg)	Dressing percentage	Points for grade*	M.L. dorsi measurements (cm)			Rib fat (J) (cm)
					A	B	C	
1	40,60	17,90	43,99	1,00	5,54	2,86	0,29	0,90
2	39,83	17,56	44,10	1,22	5,59	2,83	0,35	0,82
2	39,17	17,33	44,15	1,22	5,60	2,94	0,22	0,65

* Points for carcass grade were: Super = 1, Grade 1 = 2 and Grade 2 = 3

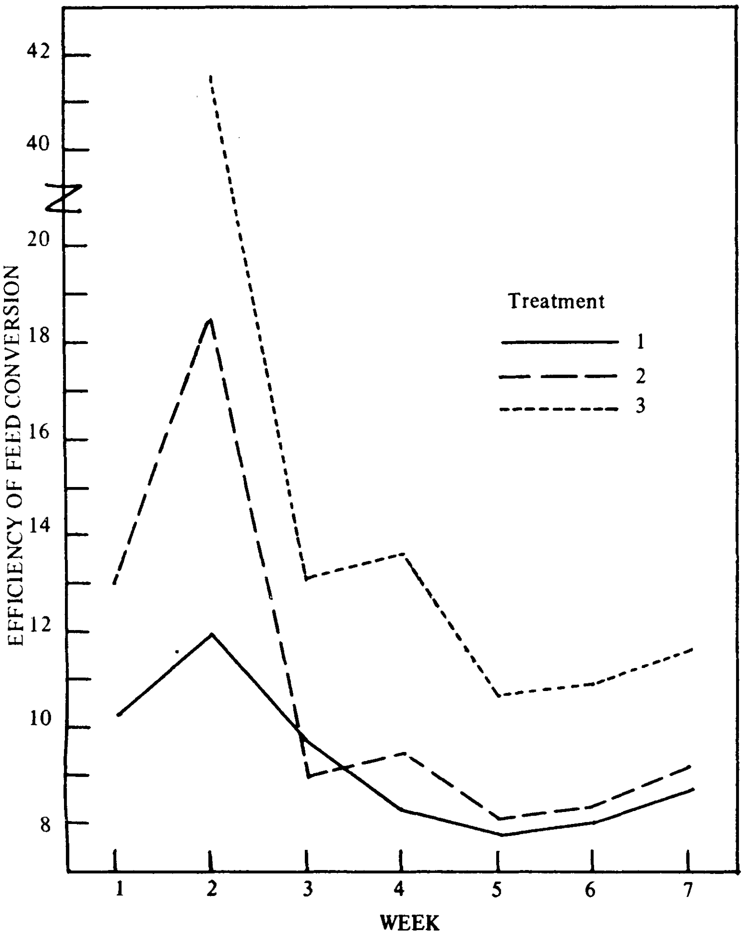

Fig. 1. *Accumulative weekly efficiency of feed conversion – Weaner Lambs.*

Economic aspect

The data obtained in this experiment were used to estimate the gross profit of the undertaking. Only the main items of costs and returns were considered. These include the initial value of the stock, feed costs and carcass value. Final and initial market values of carcasses as well as feed costs were calculated at ruling market prices. These calculations are summarised in Table 8. From the above results it is clear that both with weaner calves and weaner lambs, the highest gross profit was achieved with Treatment 2 and the lowest with Treatment 3.

Discussion

Palatability is a very important factor in a ration. An increased intake improves both feed conversion and feed efficiency. In the present study the mean daily feed intake of weaner calves decreased and the total feed intake increased, with an increase in the chicken litter content of the ration. A feature of the ration containing 40% chicken litter was an irregular daily feed intake. In addition, scouring and bloating were encountered with the diets containing chicken litter. Fewer problems of this nature were encountered with the control ration. It is possible that the bloating and digestive disorders could be responsible for the lower feed intake. The suppression of feed intake could also be due to lowering of palatability or lack of bulkiness in the rations. According to Table 1 A the estimated crude fibre content of the experimental rations was only 12,7% as against 14,1% in the control ration. In addition the estimated TDN was low in the experimental rations. Available digestible energy would appear to have been a limiting factor.

In the case of the weaner lambs, no significant difference in daily feed intake between treatments was established. Poorer gains in body mass were a feature of the rations containing chicken litter. These differences were, however, found to be statistically non-significant (P = 0,05). The addition of chicken litter to the ration even at the 40% level, therefore, did not suppress the intake of the lambs. Referring to Table 1B, it may be seen that the 3 rations were very nearly equal in crude protein, crude fibre and TDN content.

Table 8

Calculation of gross profit (Rands)

Treatment	Initial value	Feed costs	Total costs	Carcass value	Gross profit per head
A. Weaner calves					
1	R48-40	R31-77	R80-17	R92-98	R12-81
2	48-40	32-08	80-48	97-14	16-66
3	47-93	33-40	81-33	92-28	10-95
B. Weaner lambs					
1	R 5-13	R 3-18	R 8-31	R10-73	R 2-42
2	4-93	2-95	7-88	10-37	2-49
3	5-36	2-54	7-90	10-27	2-37

No statistically significant differences between treatments in body mass gain were found. The total gain in body mass as well as the mean daily gain in body mass were, however, notably lower in Treatment 3 than in the other 2 treatments As the total feed intake did not differ much between treatments, the difference in gain in body mass could be due to a lower digestible energy content in the ration containing 40% chicken litter.

Differences in feed conversion between treatments were non-significant in spite of a rather large difference between treatments i.e. 8,68 cf. 11,59 in Treatment 1 and 3 respectively. According to these results it therefore appears feasible to compile efficient sheep fattening rations containing chicken litter.

With regard to the statistical analysis of slaughter, data of the weaner calves, it is interesting to note that significant differences between treatments were only established in the B measurement of the eye muscle (*M. longissimus dorsi)* and in the thickness of rib fat (J). No explanation can be offered for the differences in eye muscle thickness.

No significant differences were established between treatments in the slaughter data. Although these differences were statistically non-significant, the poorer grading in the treatments containing chicken litter was due to a lack of finish of the carcasses The deficiency of fat covering is a further indication of a possible lowered digestible energy supply in these rations. When compiling fattening rations containing chicken litter due care should be taken to supply sufficient digestible energy.

The inclusion of 20% chicken litter in the ration successfully reduced feed costs which resulted in the highest gross profit margin. The 40% level was apparently too high and it reduced the profit margin as a result of decreased daily feed intakes by cattle. The results of this study suggest that including chicken litter could be advantageous when considering suitable fattening rations for cattle and sheep. The use of this by-product could be a valuable source of income to the poultry industry.

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