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THE USE OF DRIED MOLASSES IN PORKER RATIONS

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OPSOMMING DIE GEBRUIK VAN DROË MELASSE IN VLEISVARK RANTSOENE

'n Metabolisme en 'n groeiproef is uitgevoer om die gebruik van droë melasse poeier in die rantsoen van groeiende varke na te gaan. Die insluiting van 10 en 20% droë melasse poeier in die rantsoen het N-balanse met 4 en 13,2% onderskeidelik verhoog, terwyl slegs geringe veranderinge in waarskynlike N-verteerbaarheid en in die verteerbare- en metaboliseerbare-energieinhoud van die rantsoen plaasgevind het. Hoewel kontrole varke vinniger gegroei het, hul voer doeltreffender benut het en effens meer vleis en minder vet in hul karkasse gehad het was die verskille klein en statisties nie betekenisvol nie.

SUMMARY

Two experiments were designed to study the effect of dehydrated molasses powder on feed digestibility, rate and efficiency of gain and carcass composition of growing pigs. The inclusion in the ration of 10 and 20% dry molasses powder increased N-retention by 4 and 13,2% respectively while only small changes occurred in apparent digestibility of N and in the digestible and metabolizable energy content of the ration. Although control pigs grew faster, utilized their feed better and had more lean and less fat in their carcasses the differences occuring were small and not statistically significant.

The availability of molasses in a dry powder form makes it suitable for inclusion in concentrate rations for pigs. Henke (1933) and Willett, Work, Henke & Marnyama (1946) showed that pigs made satisfactory gains on diets containing up to 20% molasses, while Brooks & Iwanaga (1967) found that molasses added at a 10% level did not significantly alter rate and efficiency of gains or backfat thickness. The present experiments were designed to study the effect of dehydrated molasses powder on the protein and energy digestibility of the ration, the rate and efficiency of gains and the carcass composition of growing pigs.

Procedure

Trial 1. Metabolism trial

Three Landrace male pigs weighing between 50,9 and 72,3 kg during the trial were used in a 3 x 3 Latin square experiment with 3 treatments and 3 periods. The treatments consisted of 3 rations containing 0,10 and 20% dehydrated molasses powder and compiled as indicated in Table 1. The molasses powder used contains 6,0% crude protein and has a dry matter content of 94,6%.

Table 1

Composition of experimental rations

Treatment		1	2	3
Yellow Maize meal,	kg	73,0	62,4	51,7
Lucerne meal,	kg	10,0	10,0	10,0
Wheaten bran,	kg	5,0	5,0	5,0
Fish meal,	kg	12,0	12,6	13,3
Dried molasses,	kg	-	10,0	20,0
Salt,	kg	1,0	1,0	1,0
Bone meal,	kg	1,0	1,0	1,0
Mineral and Vitamins*,	kg	0,15	0,15	0,15

* A commercial mineral, vitamin mixture was used.

Each experimental period was divided into a preliminary period of 14 days and a collection period of 5 days during which faeces and urine collections were made. Whilst in the metabolism crates the pigs had free access to water and were fed 2000 g of air-dry feed during the first period and 2270 g in the second and third periods. Feed not consumed by the animals was weighed back daily. Daily collections of faeces and urine were made. One tenth of the daily faecal excretion was sampled and dried at 100°C for 24 hours. The accumulated samples for each pig was ground, sampled and stored in an air-tight container for analysis. Hydrochloric acid was used as urine preservative. Urine pH was adjusted to between 2 and 4. Daily urine volumes were measured, a 10m sample taken for analyses and the accumulative samples for each pig stored at 4°C.

The nitrogen and moisture content of the feed, faeces and urine was analysed according to the methods of the A.O.A.C. (1955). The figures obtained were used to calculate the crude protein (Nx6,25) content of the rations and the average daily nitrogen retention for the pigs on each of the three rations. The energy content of the feed, faeces and urine was determined with an automatic adiabatic bomb calorimeter as described by Kemm, Pieterse, Griessel & Mammes (1971) and the digestible energy (DE) and metabolizable energy (ME) content of the experimental rations calculated.

Trial 2. Growth trial

Twenty Landrace x Large White crossbred pigs averaging 19,90 kg in weight and 56 days old were divided according to sex, liveweight and litter origin into two comparable groups of ten each and allotted to two nutritional treatments. The rations fed, Treatments 1 and 3 in Table 1, contained 0 and 20% molasses powder. The pigs were fed *ad lib* to a final weight of between 42 and 46 kg. A pig attaining the desired weight on Tuesday was slaughtered the

following day. The carcass was kept in cold storage for 48 hours whereafter it was weighted to obtain its cold carcass weight. The carcass measurements were then measured on the split carcass, according to the method described by Kemm *et al.* (1971). The right side of all carcasses was ground, freeze dried and chemically analyzed for moisture fat, protein and ash as described by Kemm *et al.* (1971). The energy content of the ground freeze dried carcass was determined by adiabatic bomb calorimeter.

Results and Discussion

Table 2 summarizes the data collected in the first trial on nitrogen retention and energy digestibility.

Table 2

Nitrogen and energy metabolism data

Treatment	1	2	3
Dry matter intake, g/day	1741,2	1926,9	1855,5
Crude protein in ration, %	18,1	17,9	18,4
Nitrogen intake, g/day	50,3	55,1	54,6
Nitrogen excretion, %of intake:			
1. In urine	50,5	49,4	43,9
2. In faeces	14,7	14,9	16,5
Apparent nitrogen digestibility, %	85,3	85,1	83,5
Nitrogen retention, %	34,8	35,7	39,6
Digestible energy:			
1. %	79,7	77,9	78,3
2. Mcal/kgDM	3,24	3,17	3,15
Metabolizable energy:			
1. %	75,8	78,5	73,5
2. Mcal/kgDM	3,08	2,99	2,95

Although the molasses content of the diet had an apparent influence on dry matter (DM) intake in that pigs on the low molasses content ration (10%) consumed 16,4% more DM per day than control pigs, while pigs on the high level ration (20%) consumed 6,5% more DM than control pigs, the differences occuring between treatments were not statistically significant. Consequently N-intake was highest in Treatment 2 pigs and lowest in Treatment 1 (control) pigs. The 10% molasses diet had no effect on apparent N-digestibility while the inclusion of 20% dried molasses had a small disadvantageous effect on apparent N-digestibility in that a mean difference of 2,0 percentage points occurred between Treatments 1 and 3. Brooks (1967a) fed a ration containing 20% molasses and found it depressed protein digestion by between 4,2 and 5,7 percentage points while nutrients other than protein were not depressed by molasses. The mechanism by which protein digestibility is depressed by molasses can, however, not be explained.

Nitrogen retention was favourably, though not statistically significantly, affected by the inclusion of molasses in the diet. Nitrogen retention expressed as a percentage of N-intake increased from 34,8% in control Treatment 1 to 35,8% in Treatment 2 and to 39,6% when 20% molasses was fed (Treatment 3). It is doubtful whether the higher N-intake and greater fish meal content of the molasses containing diets could have improved N-retention in Treatments 2 and 3.

The average growth, feed utlization and carcass composition data of pigs fed the control and 20% dried molasses diets to porker weight in trial 2 are shown in Table 3.

Table 3

Average growth, feed utilization and carcass composition data

Treatment	1	2
Initial weight, kg	20,0	19,8
Slaughter weight, kg	44,2	45,4
Daily gain, kg	0,686	0,637
Feed utilization, kg/kg gain	2,72	2,92
Carcass characteristics:		
Dressing percentage	69,8	70,4
Carcass length, mm	653,4	669,4
Average backfat thickness, mm	15,9	16,2
C+K fat measurement, mm	23,1	21,6
Eye-muscle area, sq. cm	19,3	18,6
Carcass composition:		
Energy content, cal/g	6897,4	6875,7
Moisture content, %	54,5	55,5
Fat content, %	21,6	21,2
Protein content, %	19,2	18,5
Ash content, %	4,0	4,1

Although control pigs grew faster, utilized their feed better and had slightly more lean and less fat in their carcasses the data presented in Table 3 revealed these differences to be small and statistically not significant. Brooks (1967b) also reported insignificant differences in growth rate but found molasses fed (20%) pigs to require significantly more feed per unit of gain than pigs fed a basal ration containing no molasses. Brooks & Iwanaga (1967) compared diets containing 10 and 49,8% molasses with rations based on maize, soyabean and fish meal. Adding molasses at the 10% level did not significantly after rate and efficiency of gain or backfat thickness, while diets containing up to 49,8% molasses induced slower gains that were less efficient in terms of either total feed or digestible energy intake. Carcasses of the pigs fed high levels of molasses had less backfat and larger loin-eye areas. Consequently up to 20% dried molasses powder can be included in porker rations composed to contain 18% crude protein without any serious effects on the growth, feed utilization and carcass composition of the pigs occurring.

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