CASSAVA ROOT MEAL AS POULTRY FEED

1. FEEDING VALUE AND METABOLIZABLE ENERGY OF CASSAVA ROOT MEAL COMPARED WITH SOME OTHER ENERGY SOURCES.

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Seven metabolism trials were carried out to compare the feeding value of cassava root meal (CRM) singly or in a combination with yellow corn (YC) or barley grains (BG) with those of other energy sources (YC,BG and YC+ Sweet potato meals (SP)) using twenty-one adult Plymouth Rock cocks. The average feeding value of CRM was 79.22 TDN, 75.90 SV and 3.134 Kcal ME/g indicating its suitability as poultry feed.

The general ranking order showed that YC,YC + CRM, YC + SP and CRM were superior in feeding value to BG + CRM and BG alone. It could be concluded that CRM and SP are good sources of energy rather than barley. The CRM could be successfully used as a substitute for YC in poultry rations and it is preferable to use it in a mixture with YC rather than alone.

As cassava plant is cultivated recently in Egypt, there is a great need to compare the feeding value of cassava root meal (CRM) with other energy sources used in poultry rations specially yellow corn (YC) under our local conditions. The importance of metabolism trails with poultry to assess directly the feeding value of feed was indicated by Raafat et al (1962) Therefore, this study was undertaken to compare the nutrients digestibility, feeding value in terms of total digestible nutrients (TDN)and starch value(SV) and metabolizable energy (ME) of CRM with some other energy sources.

MATERIAL AND METHODS

Cassava root meal (CRM): Cassava is a single species , Manihot esculenta Crantz. It was prepared from the yield of 10-month-old cassava plants of the variety Valenca (imported from Indonesia) grown at each of Dokki Poultry Farm and El-Nobaria Location (4-01-154).

Yellow corn (YC), barley grains (BG), two sweet potato meals derived from two varieties namely Mabrouka (Mab. SP). and Mangawi (Man. SP) were purchased from the open market. All samples were finely ground to be ready for analysis or use in feeding birds.

The fresh cassava tubers, after harvesting at 10 months of age were washed, then cut into large slabs. The slabs were then sundried, bagged and stored. The dried slabs were finely ground or milled to produce greyish white flour and the resulting meals (CRM) from the different harvest lots were pooled and thoroughly mixed. Pellets were prepared from mixtures of CRM with other required ingredients before carrying the metabolism trials. The powdery mixture was moistened with water, passed through meat mincer, then dried in an oven at 60°C over night. Sweet potato meals were prepared as desciribed for CRM.

Seven metabolism trials were undertaken to find out the nutrients digestion coefficients, ME,and feeding value of YC, CRM, BG, and four mixtures being YC+CRM, BG+CRM, YC+Mab. SP. and YC+Man SP. at the ratio of 1:1 . Twenty-one adult cocks (Plymouth Rock) of 36 weeks old were randomly taken from Dokki Poultry Farm Flock. They were housed in individual metabolic cages. Three cocks were used in each trial for four days preliminary period followed by three days collection period. Feeds and fresh water were offered ad-lib .

The scattered feed was collected and deducted from the amount offered. The excreta of individual birds falling on a tray covered by aluminium foil were quantitatively collected every 24 hours and cleaned from feathers and scattered feed.

The exreta were sprayed with 1% boric acid solution to prevent any loss in ammonia during drying at 80℃ for 24 hours. The dried excreta from each bird during the three experimental days were mixed together, finely ground, and placed in a screw-top glass jar for analysis. The nutrients digestibility , ME, and feeding value (TDN and SV) of the ingrdients alone or in mixture were determined.

The TDN was calculated in the usual method using the factors 1, 2.25 and 1 for digestible CP, EE and crude carbohydrates (CF and NFE), respectively. The conversion factors of Buchmann (in Ghoneim, 1964) being 1.03, 3.11 and 1.00 for digestible CP, EE and crude carbohydrates (CF and NFE), respectively , were used to calculate the apparent SV. True SV was calculated using a value number of 95% as suggested by Abou-Raya et al. (1974) for poultry feeds.

Calorific value: The dried and finely ground samples of feed and excreta were assayed for gross energy (GE) using the balastic bomb calorimeter as described in details by Abou-Raya et al (1985). The metabolizable energy (ME) was calculated as follows:

ME/g feed = GE/g feed-Dry matter ratio x GE/g excreta

The conventional mehtods of the Association of Official Analytical Chemists (1980) were adopted for chemical analysis of moisture , crude protein (CP),ether extract (EE) , crude fibre (CF) and ash. Faecal nitrogen was determined according to the method of Jakobson et al (1960). Nitrogen free extract (NFE) was obtained by difference. In the dry matter of the excreta,this was as follows:

Faecal NFE % = 100-(%CP+%EE+%CF+%ash + % urinary OM).

Calculation of urinary organic matter (UOM) : Urinary nitrogen was determined by difference (excreta N-faecal N). Urinary organic matter was calculated assuming each unit of N corresponding to 2.62 units urinary organic matter as deduced by Abou-Raya and Galal (1971) . The percentage scatter of urinary N was 62.9 from uric acid, 17.3 from ammonia, 10.4 from urea and 9.4 from cereatine plus other components as indicated by Sturkie (1954).

Statistical analysis: Analysis of variance was conducted on the data in accordance with procedures described by Steel and Torrie (1980). Significant differences between treatment means were determined using Duncan's multiple range test (1955).

RESULTS AND DISCUSSIONS

The mean values of chemical composition, digestion coefficients, digestible nutrients, feeding value and metabolizable energy of the seven test materials are presented in Table 1. The range and ranking order of the above values are summarized in Table 2.

Comparing the results of CRM singly or in a combination with YC or BG with those of other energy sources (YC, BG, YC + SP), it was found that using CRM produced generally reasonable values.

Table 1. The analyses, digestion coefficients, feeding value and ME of CBM and some other energy sources using metabolism trials with adult Plymouth Rock cocks.

Trial No.	Item	OM %	CP %	EE %	CF %	NFE %	Ash %	N balance[1] %	Feeding value: TDN %	Feeding value: SV %	Feeding value: Determined ME kcal/g
1	YC (10.40% moist.):										
	Analysis on dry matter basis	98.29	8.93	4.14	3.57	81.65	1.71				
	Digestion coefficients	86.30	82.95	87.38	23.09	89.36	-				
	Digestible nutrients	84.82	7.41	3.63	0.82	72.96	-				
	Feeding value and N balance							29.00	89.36±0.49[2] a	88.07±0.31 a	3.499±0.016 a
2	CBM (9.60% moist.):										
	Analysis on dry matter basis	97.01	3.10	0.89	4.09	88.93	2.99				
	Digestion coefficients	80.78	82.11	77.63	16.08	83.74	-				
	Digestible nutrients	78.36	2.54	0.69	0.66	74.47	-				
	Feeding value and N balance							13.91	79.22±0.42 c	75.90±0.39 c	3.134±0.016 c
3	YC+CBM (9.90% moist.):										
	Analysis on dry matter basis	97.55	6.10	2.55	3.93	84.97	2.45				
	Digestion coefficients	83.48	85.66	83.30	19.13	86.26	-				
	Digestible nutrients	81.43	5.22	2.12	0.75	73.38	-				
	Feeding value and N balance							37.26	84.12±1.18 b	81.79±1.10 b	3.315±0.060 b
4	BG (11.23% moist.):										
	Analysis on dry matter basis	97.07	9.47	2.17	8.59	76.84	2.93				
	Digestion coefficients	74.57	81.85	24.77	21.02	81.02	-				
	Digestible nutrients	72.38	7.75	0.54	1.81	62.26	-				
	Feeding value and N balance							35.39	73.04±0.62 d	70.04±0.57 d	2.647±0.020 e
5	BG+CBM(10.51% moist.):										
	Analysis on dry matter basis	97.04	6.29	1.53	6.34	82.88	2.96				
	Digestion coefficients	75.76	83.82	55.11	19.16	79.74	-				
	Digestible nutrients	73.42	5.27	0.84	1.21	66.09	-				
	Feeding value and N balance							31.83	74.46±1.22 d	71.57±1.09 d	2.789±0.074 d
6	YC+Mab. SP (8.90% moist.):										
	Analysis on dry matter basis	97.38	6.59	5.58	5.42	79.49	2.52				
	Digestion coefficients	80.20	83.34	80.67	18.23	84.06	-				
	Digestible nutrients	78.10	5.78	4.50	0.99	66.82	-				
	Feeding value and N balance							23.78	83.72±2.35	83.37±2.35	3.278±0.045
7	YC+Man. SP (9.11% moist.):										
	Analysis on dry matter basis	97.59	8.09	6.18	5.17	78.15	2.41				
	Digestion coefficients	78.59	85.37	78.46	24.81	81.46	-				
	Digestible nutrients	76.70	6.91	4.85	1.28	63.66	-				
	Feeding value and N balance							37.85	82.76±0.52	82.78±0.49	3.207±0.017
Mean of 6 and 7	YC+SP. Mean digestion coefficients and feeding value of YC+Mab.SP and YC+Man. SP.	79.40	84.60	79.56	21.52	82.76			83.24 b	83.08 b	3.242 bc
	SP[3]	74.50	86.25	71.54	19.95	76.16			77.12	78.09	2.985

Means within a column with different letter superscripts are significantly different ($P<0.05$)

1) From total N-intake 2) Standard error (SE) 3) Values of SP calculated by difference.

Table 2. The range and ranking order of digestion coefficients, feeding value and ME of test materials.

	Range	Ranking order*					
		1	2	3	4	5	6
OM	86.30-74.57	YC	YC+CRM	CRM	YC + SP	BG+CRM	BG
CP	85.66-81.85	YC+CRM	YC+SP	BG+CRM	YC	CRM	BG
EE	87.58-24.77	YC	YC+CRM	YC+SP	CRM	BG+CRM	BG
CF	23.09-16.08	YC	YC+SP	BG	BG+CRM	YC+CRM	CRM
NFE	89.36-79.74	YC	YC+CRM	CRM	YC+SP	BG	BG+CRM
TDN	89.36-73.04	YC	YC+CRM	YC+SP	CRM	BG+CRM	BG
SV	88.07-70.04	YC	YC+SP	YC+CRM	CRM	BG+CRM	BG
ME	3.499-2.647	YC	YC+CRM	YC+SP	CRM	BG+CRM	BG

1,2,3,4,5 and 6 indicate the ranking order according to the mean values of the 6 test materials being 1 for the highest value and 6 for the lowest value,.. etc.

The CP was highly digested with CRM singly or in a combination with YC or with BG. The digestion coefficients of CP ranged from 85.66 to 81.85% being the highest for YC+CRM followed by YC + SP, BG+CRM, YC, CRM and BG. The CP digestibility of the present CRM (82.11%) was lower than the value of 86.0% reported by Axelsson (1937) but higher than the value of 66%, obtained by Lim (1968), Such variation might be due to differences among cassava cultivars used or due to the procedure used for separating urinary N from faecal N. (Abou-Raya and Galal,1971).

Compared to yellow corn or maize the CP digestibility of CRM was nearly similar to the corresponding values of 80.74% and 79% reported by Ismail (1964) and Lim (1968) , respectively, but lower than the values of 84.59%, and 88.78% obtained by Abou-Raya and Galal (1971) and Shalaby et al. (1982), respectively.

In a comparison with BG,the digestibility of CRM protein surpassed those of Abou-Raya et al (1963), Abou-Raya and Galal (1971) and Titus and Fritz (1971) being 73.05% , 70.81% and 74%, respectively. Oyenuga and Fetuga (1975) showed that digestibility of CP of CRM was higher than that of sweet potato which is not in harmony with the present finding. The value of SP obtained by Titus and Fritz (1971) was distinctly lower (40%) than the present value of CRM. It was noticed that CP digestibility of the mixture containing CRM with either YC or BG was superior to that of CRM alone. This is probably due to the associative effects and perhaps to CP level in the dry matter.

The highest digestibility was obtained for EE in YC, YC+CRM, YC+SP and CRM while the lowest values were recorded for BG+CRM and BG, This might be explained probably by easier digestibility of YC, CRM and SP fat than that of BG. The value of EE digestibility of CRM (77.63%) was within the published range of 85 to 50% reported by Axelsson (1937) and Lim (1968). The CRM has EE value comparable with those of

YC obtained by Ismail (1964), Abou-Raya and Galal (1971) and Shalaby et al. (1982) being 79.54, 72.92 and 79.45%, respectively but higher than the value of 60% reported by Lim (1968) for maize, and lower than the value of 88% reported by Titus and Fritz (1971). The value was markedly higher than the reported values for barley EE by Abou-Raya et al.(1963), Titus and Fritz (1971) and Abou-Raya and Galal (1971) being 49.93, 62 and 54.54%, respectively and for SP (70%) reported by Titus and Fritz (1971).

It was found that the presence of YC in the mixture with CRM improved the digestion coefficient of EE of CRM. On the other hand, the presence of CRM in the mixture with BG improved EE digestion coefficient of the later. This might be due to the associative effect in improving the digestion coefficient of some ingredients alone.

The digestion coefficients of CF ranged from 23.09 to 16.08% indicating a significant digestion in CF. This might be achieved by microorganisms in the caecum and the crop (Ibrahim, 1969). The variation in CF digestibility among the test materials might be due to the differences in the CF nature of feeds and perhaps other unknown factors.

It is obvious that the value of CF digestibility of CRM in this study (16.08%) was distinctly lower than that of Lim (1968) being 76%, but higher than the values of 8% and 0.0% reported by Axelsson (1937) and Vogt (1966), respectively. The nature of CF appears to vary according to the plant cultivar.

Compared with the corresponding value of YC, the CF digestibility of CRM was nearly similar to those reported by Ismail (1964), Abou-Raya and Galal (1971) being 14.51 and 15.26%, respectively, but lower than the value of 37% reported by Lim(1968) and higher than the values of 6% and 8.05% reported by Titus and Fritz(1971) and Shalaby et al.(1982), respectively. The CF value was markedly higher than the previously reported values of barley since Abou-Raya et al. (1963) and Abou-Raya and Galal (1971) obtained negative values being -1.03 and -3.57% respectively, while the value reported by Titus and

Fritz (1971) was 9%. Compared with SP, the CF digestibility of CRM was lower than the value of 20% reported by Titus and Fritz (1971) for SP which was in a good agreement with the present finding. Gerpacio et al. (1978) found that CF digestion coefficients for broiler diets containing 50% YC, 50% CRM or 50% SP were 59.47, 58.98 and 35.28%, respectively. This indicated that the values of YC and CRM were similar and higher than that of SP.

Regarding the NFE which is the main constituent of the present test materials including CRM, it was found that the digestibility was markedly high. The digestion coefficients ranged from 89.36 to 79.74% being the highest value for YC followed by YC + CRM, CRM and YC+SP, while those of BG and BG + CRM were the lowest.

The digestion coefficient of NFE for CRM (83.74%) was in good agreement with that of Agudu and Thomas (1982) being 83.8%, while was lower than the values of 87 and 98% reported by Vogt (1966) and Lim (1968). However, this value was within the published range (81.92-92.0%) of several investigators on YC (Ismail, 1964 ; Lim, 1968 and Shalaby et al, 1982). The value was higher than the values of NFE digestibility in barley reported by Abou-Raya et al. (1963), Titus and Fritz (1971), and Abou-Raya and Galal (1971) being 70.84, 82 and 80.19%, respectively, while it was lower than the corresponding values for SP reported by Yoshida and Morimoto (1958), Titus and Fritz (1971) and Oyenuga and Fetuga (1975) being 90.8, 88.0 and 93.8%, respectively.

This finding showed clearly that CRM and SP are better sources of energy rather than barley in poultry rations.

The digestion coefficients of OM ranged from 86.30 to 74.57% being the highest for YC followed by YC+CRM, CRM and YC+SP, while the lowest values were recorded with BG+CRM and BG. The OM digestibility of CRM was nearly similar to the value of 83.0% obtained by Lim (1968). It was in harmony with the value in YC obtained by Ismail (1964) and Abou-Raya and Galal (1971) being 79.35 and 85.0%, respectively, but lower than the value of 88% reported by Titus and Fritz (1971). The value was higher than the reported value for barley by Abou-Raya et al (1963), and Abou-Raya and Galal (1971) being 64.44 and 73.36 respectively, while it was comparable to the value of 82% obtained by Titus and Fritz (1971) for SP.

It is commonly known that poultry feeds should have an OM digestion coefficient not less than 70% (Abou-Raya and Galal, 1971). Therefore, all the present materials are considered good feeds for poultry. It is clear that the digestion coefficient values of NEF and EE nearly followed the same ranking order of those of OM confirming the superiority of YC, YC+ CRM, CRM and YC+SP to BG+CRM and BG.

The feeding value in terms of% SV and TDN ranged from 88.07 to 70.04 for SV and from 89.36 to 73.04 for TDN being generally high and could be considered suitable values for poultry feeds. The average feeding value of CRM was 79.22 TDN and 75.90 SV which were lower than those of YC, YC+CRM and YC+SP. But they were higher than those of BG+CRM and BG. Therefore, the results of TDN and SV showed that YC, YC+ CRM, YC+SP and CRM were superior in quality to BG+CRM and BG. The lower feeding value of BG or BG+CRM might be due to their relatively higher CF compared with those of other tested materials.

It is interesting to record that the values of TDN in the present feeds were similar to those of true SV because they have low fibre content. It might also be due to using Abou-Raya et al. (1974) suggested value number of 95% to compute true SV figures in poultry feeds from apparent SV calculated according to Buchman's factors. The TDN value of CRM in the present study (79.22) was in agreement with those reported previously by Lim (1968) and Mudgal and Sampath (1972) being 79.3 and 83.3 respectively, but higher than those of Axelsson (1937) and Yoshida (1970) who gave the values of 71.76 and 70.0, respectively. Such variation might be due to the different digestible nutrient values which were affected by digestion coefficients, chemical composition, type of cassava cultivar and breed and age of birds used.

The present value of SV (75.90) was nearly similar to that of 79.2 reported by Lim (1968). This slight difference might be as a result of using different factors in calculating SV in addition to the above mentioned reasons.

Compared with YC, the present values of CRM were nearly similar to those of 77.5 TDN and 78.2 SV, 76.66 TDN and 77.74 SV and 81 TDN and 79.96 SV obtained by Lim (1968), Abou-Raya and Galal (1971) and Titus & Fritz (1971), respectively. But they were lower than the values of Tawakkol (1969), Ismail (1964) and Shalaby et al. (1982) which were 87.13 TDN and 89.57 SV, 82.70 TDN and 81.04 SV, and 82.31 TDN and 85.06 SV, respectively. This confirmed the superiority of YC to CRM in feeding value obtained in the present study.

The previous data of 62.77 TDN and 59.80 SV, 59.41 TDN and 54.43 SV, 64.26 TDN and 63.41 SV and 68.0 TDN and 65.36 SV for barley reported by Abou-Raya et al. (1963), Tawakkol (1969), Abou-Raya and Galal (1971) and Titus and Fritz (1971) were distinctly lower than the corresponding value of CRM confirming the superiority of CRM to barley. The feeding value of SP reported by Titus and Fritz (1971) were 82.14 TDN and 81.5 SV on DM basis being slightly higher than the present value of CRM while the SV reported by Titus (1955) was lower being 70.6 . However, the findings of Oyenuga and Fetuga (1975) and Gerpacio et al. (1978) supported that the present results indicated the similarity of using CRM or SP as a source of energy in livestock diets.

The ME concept is still the most reliable value in evaluating poultry feeds, and is considered the final reference in such kind of studies. The determined ME in the present feeds ranged from 3.499 to 2.647 Kcal/g indicating the superiority of YC , YC+CRM, YC+SP and CRM to those of BG alone or in a combination with CRM. It is obvious that the high digestion coefficient of NFE, EE and OM were reflected in the ME value of feeds since all these values ranked the test materials in similar sequences. It is also clear that the values of TDN followed exactly the same ranking order of ME rather than those of SV. However, it is easier in practice to use TDN in evaluating poultry feeds rather than using SV.

It was found that feeding a mixture of YC+CRM gave higher values for digestibility, feeding value and ME than those of CRM alone but were nearly similar to those of YC alone which is one of the most commonly used cereals in poultry rations. Therefore, it appears preferable to use a mixture of YC + CRM rather than using CRM alone. The mean ME value of CRM (3.134 Kcal/g) in this study was within the published data of Aguirre et al. (1979) for samples of five cassava cultivars ranging from 3.06 to 3.39 Kcal/g with the average of 3.20 Kcal/g. The value was also similar or lower than the values of 3.440, 3.089, 3.650, 3.500, 3.760 and 3.215 Kcal/g for CRM reported by Olson et al. (1968), Titus and Fritz (1871), Müller et al. (1974), Ademosun and Eshiett (1980), Ravindran et al. (1983) and Stevenson and Graham (1983), respectively. The variation among such values might be due to the cultivar of cassava and/or the experimental conditions.

Comparing with ME of YC, the ME of CRM was lower than the present value (3.499 Kcal/g) and than the previous values of 3.840, 3.950, 3.659, 3.660 and 3.610 Kcal/g reported by Sibbald et al. (1960), Hill et al. (1960), Tawakkol (1969), Müller et al. (1974) and Shalaby et al. (1982), respectively. But they were in harmony with values of 3.170, 3.329, and 3.350 Kcal/g obtained by Squibb (1971), Titus and Fritz (1971) and NRC (1984) indicating the important role of CRM in replacing YC in poultry rations. Recently, Dale and Fuller (1985) reported that ME_n for YC was 3.90 Kcal/g on DM basis while that for CRM was 3.33 Kcal/g. Using YC as a standard they found that CRM had a relative energetic value of 85.4%.

The ME of CRM was markedly higher than that of BG in this study (2.647 Kcal/g) and than the value of 2.369, 2.741, 2.730 and 2.640 Kcal/g reported by Tawakkol (1969), Titus and Fritz (1971), McDonald et al. (1973) and NRC (1984), respectively. This indicated the superiority of using CRM as an energy source in poultry rations rather than barley.

Comparing the feeding value and ME of the tested three mixtures, it was noticed that the values of YC+CRM and YC+SP were similar and higher than that of BG+CRM. This indicated that the feeding value and ME of CRM was comparable to that of SP. Calculating the ME of SP alone by difference using ME of YC showed that the values of CRM (3.134 Kcal/g) and SP (2.985 Kcal/g)were nearly similar confirming the above finding, while it was lower than the SP value of 3.596 Kcal/g reported by Oyenuga and Fetuga (1975). Howerver, Oyenuga and Fetuga (1975) and Gerpacio et al. (1978) concluded that CRM and SP could replace cereals in diets of livestock as a source of energy.

. However, the statistical analysis (Table 3) revealed that there was treatment significant (P<0.05) effect on the feeding values and ME. Variation among replicates within each treatment

Table 3- Analysis of variance of feeding value and ME

	Mean squares		
	Treatments df = 5	Replicates df = 2	Error df = 10
TDN	115.746*	3.260^{NS}	2.747
SV	149.706*	2.785^{NS}	2.571
ME	0.3170*	0.0078^{NS}	0.0048

* $P < 0.05$ NS = Not significant

was not significant. The feeding value and ME of YC was significantly ($P < 0.05$)higher than those of other test materials. Although the differences between the values of YC+CRM and YC+SP were not significant, their values were significantly ($P<0.05$) higher than those of CRM alone except in the case of ME where the difference was not significant between YC+SP and CRM. The BG+CRM and BG gave significantly ($P<0.05$) lower feeding value and ME than those of all the other test materials.

It appears from the results of N-balance as a percent of N-intake (Table 1) that the digestible protein in all the present test materials was adequate to maintain positive N-balance. The mixture of CRM+YC gave the highest N-balance being 37.26 % while that of CRM alone was the lowest (13.91%). The low N-balance value of CRM was mainly due to its low content of CP compared with other tested feeds. However, using CRM alone did not result in a negative N-balance with adult cock fed ad-lib. Therefore, CRM could be used as an ingredient in formulating suitable poultry rations, bearing in mind the more suitability when mixed with YC. However, such variation among the present results and the previously reported values might be mainly due to the cultivars differences or to using cocks differing in breed or age. In this connection, Aguirre et al. (1979) showed a wide range (3.06 to 3.39 Kcal/g) for ME values of chicks fed five cassava cultivars. Abou-Raya et al. (1974) obtained higher ME with White Plymouth Rock cocks than those obtained with Fayoumi cocks. Slinger et al. (1964) showed that the breeds metabolized the energy of their feeds differently.

It could be concluded from the foregoing results and discussion that CRM and SP are good sources of energy rather than barley. The CRM could be successfully used as a substitue for YC in poultry rations and it is preferable to use in a mixture with YC rather than alone.

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استعمال مسحوق جذور الكاسافا كغذاء للدواجن

١) مقارنة القيمة الغذائية لمسحوق جذور الكاسافا ببعض مصادر الطاقة الأخرى .

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أجريت ٧ تجارب هضم لمقارنة القيم الغذائية لمسحوق درنات الكاسافا بمفرده أو مخلوطا مع الذرة الصفراء أو مع الشعير بالقيم الغذائية للذرة الصفراء والشعير ومخلوط من الذرة الصفراء مع نوعين من البطاطا . واستخدم فى ذلك ٢١ ديكا بالغا (بليموث روك).

دلت نتائج هذه التجربة على امكانية استخدام مسحوق درنات الكاسافا كمصدر للطاقة فى تغذية الدواجن حيث كان متوسط القيم الغذائية ٧٩ر٢٢ ٪ مركبات غذائية مهضومة كلية ، ٧٥ر٩٠ ٪ معادل نشا ، ٣ر١٣٤ كيلو كالورى طاقة ممثلة لكل جرام من المسحوق ، وبالمقارنة بالقيم الغذائية لبعض المواد الشائعة الاستخدام فى تغذية الدواجن كمصدر للطاقة (الذرة الصفراء - الشعير - البطاطا) فقد وجد أن الترتيب التنازلى للقيم الغذائية من حيث الجودة كان على التوالى : تفوق الذرة الصفراء يليه مخلوط الذرة الصفراء + درنات الكاسافا فمخلوط الذرة الصفراء + درنات البطاطا فدرنات الكاسافا ثم مخلوط الشعير + درنات الكاسافا ثم الشعير بمفرده . ويستنتج من ذلك أن مسحوق درنات الكاسافا ومسحوق درنات البطاطا تعتبر مصادر أكثر جودة للطاقة عنه فى الشعير. كما يمكن استعمال مسحوق درنات الكاسافا بنجاح كبديل للذرة الصفراء فى علائق الدواجن على أن يفضل استخدام مخلوط مسحوق درنات الكاسافا مع الذرة عن استخدامه بمفرده كمصدر للطاقة فى العلائق .

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