ASSESSMENT OF SOME QUALITIES OF COMMERCIAL LIVESTOCK FEEDS

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ABSTRACT

The nutrient qualities of different classes of commercial livestock feeds were monitored over a period of 20 weeks for changes in their chemical composition as well as differences between actual chemical contents and tagged specifications. Feed samples were collected from farms and feed depots around Abeokuta in Ogun Sate. Results obtained revealed wide ranges of values ($P<0.05$) within feeds of the same class, depending on the miller(s). Creep feed pellet had CP values (21.98±0.21%) which were 0.01% less than the recommended nutrient requirement for creep pigs. There was low CP in some layers diet (13%) $P<0.05$). All feeds types analysed had consistently and significantly higher crude fibre values than recommended for the relevant animals while energy and CP were noticeably low. The study further showed that finished feeds and feed ingredients were adulterated with saw dust, sand, urea, rice bran, etc. The needs for feed quality standardization and monitoring as well as the usage of agro-industrial by-products in appropriate proportions were examined and recommendations made.

Key words: Quality control, adulteration, feed, nutrients.

INTRODUCTION

Animal feeds and feedingstuffs occupy a very important place in the raising of livestock. Infact, feeding accounts for about 60 - 80% of the total production cost, especially in intensively managed stock. Privately owned feedmills sprung up in Nigeria in the early seventies and eighties (Jakonda, 1975; Fetuga, 1975) in an attempt to satisfy the accelerating demand for livestock feeds. However, present day conditions have forced quite a number of them to shut down. The performance of livestock depends, to a great degree, on the provision of adequate nutrients for various productive purposes (NRC 1979; Olomu, 1980). Feedmill capacity under-utilization and the quest to reduce production cost may have led to adulteration of the quality of the small amounts of feed produced. Feed ingredients types, cost and quality also influence the final feed quality. Wall *et al* (1975) observed chemical and physical changes during the drying of maize grains. Ergul (1981) investigated the effect of storage on the lysine content of Turkish Fish meal and observed a decrease of 20%, irrespective of temp. Feed quality standard monitoring is yet to be effective in this country. To date, the Standard Organisation of Nigeria has not put any strong measure in place to check feed adulteration.

This study was therefore designed to examine the physical and chemical characteristics of some compounded livestock feeds used in raising poultry (broilers, layers & pullets/chicks), rabbits and pigs feeds. Based on the results, it would be ascertained whether there are important changes in their qualities and if their manufacturer's proclaimed chemical qualities agree with tag specifications attached to the feed bags.

MATERIALS AND METHODS

3kg each of feed samples for various classes of livestock were collected from eight Feed millers (Labelled A to H). The samples were collected directly from farms where they were used within the period of the study. Details of the farms/feed - millers (eg names, locations, etc) are not specified in this report for obvious reasons.

The feed classes understudied were:

Broiler Starter; Pig Weaners diet; Chicks mash;

Broiler Finisher; Pig Breeders diet; Growers mash;

Pig Creep pellet; Pig fatteners diet; Layers mash; Rabbit pellets;

These were collected once weekly over a period of four months (20 weeks) and were assessed/analysed soon after collection

Sample analyses

Samples collected were analysed for their proximate chemical composition using the AOAC (1990) method of analyses as specified for feedstuffs. Particle size was assessed with soil sieves in the lab while smell and colour were subjectively appraised. Statistical analysis was according to Steel and Torrie (1980).

RESULTS AND DISCUSSION

Feed Particle Size

Physical examination of all the feed samples indicated variations among their grists. In most cases, maize grains were not finely ground and whole maize grains could be seen in the samples collected. 80% of the millers used white maize to compound all their rations. The calcium sources (bone meal and Oyster shell) were also not well crushed in the final mix. The assessed feed particle sizes ranged from 2mm-8mm sieve sizes. The very powdery ones could be problematic in livestock feeding, especially since they could generate respiratory problems.

Aroma/Smell of Feed

Kernel oil smell was perceived in some of the feed samples especially in the growers mash indicating apparent abuse of Palm Kernel meal/cake in the feeds. This may have been done by the millers to reduce the cost of feed production without necessarily maintaining quality and, by so doing, increasing fibre load for the end users. This observation cuts across feeds for poultry, rabbits and pigs. Where high-oil PKC is used, the keping quality of the feed will be reduced.

Colour

The colours of feed samples observed ranged from light brown (from the effect of wheat bran or rice husk) to oily dark brown. The maize type used (Yellow or white) was easily distinguishable and the study showed that more white than yellow maize was used to compound livestock feed within the study period. This preference by millers may be due to the relative cheapness of white maize as compared to yellow, when available.

Chemical Composition of Feeds

The chemical contents of broiler starter and finisher mashes obtained from three feed millers (Table 1) indicate that their crude protein values ranged from 18.15 to 19.44g/100g DM for broiler starter and 14.52 to 20.48 for broiler finisher mashes. These values, however, were not in agreement with those specified on the feed bag tags (labels). Such differences in dietary nitrogen levels could be indicative of intentional adulteration since protein concentrates are quite expensive. The far reaching implication is that the performance of the stock could be affected as was earlier indicated by Scott (1969) especially as it related to ceasation of growth, and striking growth loss. Arnall and Keymer (1975) and Clark *et al.*, also reported that protein deficiency can cause some physiological conditions which may reduce feed efficiency, increase the sensitivity to afflatoxin, increase protein synthesis in the liver and the birds will thus have generally unattractive appearance. Excess protein, however, also results in slight decrease in growth, reduction in body fat deposit and an increase in uric acid level in the blood. Availability of the high N to stock is another issue especially with poultry, as some millers also adulterate feed with fertilizer grade urea nitrogen, and these may not be utilizable by poultry.

Crude fibre levels were averagely higher than the NRC (1979) recommended levels and could have arisen from feed adulteration with excess of agro-industrial product e.g. rice bran, rice husk, dried brewers grain, wheat offals, etc. which are relatively cheaper but obviously more fibrous than the conventional sources of energy. Excess fibre could also cause impaction of the crop and gizzard, impair gut functions, dilute energy, among other effects. Adherence to the minimum prescribed feed standards by feed millers will ensure that farmers can obtain feeds of reasonable

TABLE 1: SUMMARY OF THE NUTRIENT COMPOSITION OF BROILER DIETS ANALYSED (g/100g DM)

Millers	Feed Class	Crude Protein	Crude Fibre	Fat	Ash	Dry Matter
A	(Broiler	19.44±2.50	6.00±3.48	3.96±1.23	7.10±0.98	86.00
B	Starter)	18.60±1.32	6.20±2.86	3.86±0.96	6.00±1.36	90.00
C		18.15±1.65	5.90±4.32	4.10±1.10	6.50±1.58	88.00
A	(Broiler	14.52±1.51	12.08±4.16	2.68±0.05	6.14±0.66	94.60
C	Finisher)	20.48±3.14	7.66±2.04	0.90±0.10	3.88±1.63	85.87
B		15.50±2.21	11.24±3.10	2.75±1.25	7.34±1.71	88.68

TABLE 2: NUTRIENT COMPOSITION OF THE CHICKS, GROWERS AND LAYERS MASHES ANALYSED (g/100g DM)

Feed Class	Millers	Dry Matter	Crude Protein	Crude Fibre	EE	Ash	NFE	ME (kcal/kg DM)
	A	89.14	21.65^{a}	6.24^{b}	4.60	6.11	61.40	$2,946^{b}$
	B	84.10	20.15^{a}	7.13^{b}	5.46	4.50	62.76	$3,169^{a}$
Chicks	B	84.60	10.93^{c}	13.45^{a}	1.21	7.09	67.32	$2,818^{b}$
	C	80.50	14.35^{b}	11.75^{a}	1.39	14.49	58.02	$2,598^{c}$
	D	74.36	14.69^{b}	6.30^{b}	1.43	2.00	75.58	$3,133^{a}$
Growers	A	89.00	16.80^{a}	10.31^{b}	4.68	8.50	59.71	$2,951^{a}$
	B	84.00	15.57^{a}	14.38^{a}	1.05	9.00	60.00	$2,705^{b}$
	C	81.80	13.81^{b}	12.91^{a}	2.48	17.50	53.30	$2,518^{b}$
	D	74.90	14.34^{b}	12.83^{a}	3.14	3.50	66.19	$3,014^{a}$
Layers	A	80.00	17.84^{b}	6.10^{b}	2.51	9.50	64.05	$2,915^{a}$
	B	81.90	17.32^{b}	10.28^{a}	3.28	10.00	59.12	$2,842^{b}$
	C	77.70	13.65^{d}	13.03^{a}	0.21	18.00	55.11	$2,444^{c}$
	D	81.40	15.92^{c}	7.95^{b}	3.14	12.20	60.79	$2,819^{b}$
	E	80.15	19.21^{a}	7.06^{b}	0.43	14.00	59.30	$2,653^{c}$
	F	85.83	15.50^{c}	6.04^{b}	3.93	12.40	62.16	$2,889^{b}$

a, b, c, d - Means in the same column under same feed class with different superscripts are significantly different ($P < 0.05$)

TABLE 3: CHEMICAL COMPOSITION OF PELLETTED RABBIT WEANER FEED (g/100g DM)

Miller	Dry Matter	Crude protein	Crude Fibre	Fat	Ash	NFE	ME (kcal/kg)
A	84.00	17.14	10.61	4.51	10.10	79.12	3,646
B	85.00	16.44	14.24	3.46	13.10	52.76	2,665
G	81.00	15.60	13.49	2.60	10.42	57.89	2,740

TABLE 4: PROXIMATE COMPOSITION OF COMMERCIAL PIG DIETS (g/100g DM)

Miller	Feed Type	Crude protein	Crude Fibre	EE	Ash	NFE	Dry Matter	Energy (kcal/kg DM)
H	Pig Creep	21.88	2.04	2.50	1.71	71.88	70.00	3,244
	Pellet	22.09	2.15	2.54	14.62	58.90	75.40	2,820
H	Pig	17.50	5.60	3.25	18.45	55.20	69.50	2,661
	Weaners	19.68	5.50	3.50	16.70	55.12	79.50	2,735
H	Pig	15.65	8.50	3.00	16.00	56.85	84.00	2,677
	Breeders	14.65	7.00	2.64	17.20	58.51	84.25	2,659
H	Pig	13.23	5.45	2.67	15.50	63.15	85.50	2,757
	Fattener	14.20	5.50	2.16	14.90	63.24	79.20	2,751

nutritive quality (Bhagwan, 1975).

Table 2 shows the chemical contents of commercial layers feed from day-old to the laying period. The CP values ranged from a low of 10.93 to 20.15% while fibre ranged from 6.30 to 13.45% for chicks mash. Values obtained varied so much ($P<0.05$) from one miller to another. The EE and Metabolizable Energy levels obtained (2,444-3,169 kcal/kg DM) indicate that their energy contents were about average but significantly different ($P<0.05$). The different values for the three samples of rabbit feeds are shown in Table 3. Protein values ranged from 15.6 to 17.14% while CF is from 10.61 to 14.24%. These values appear adequate since, for rabbits, fibre is desirable. Scholaut (1985) reported that adult non-breeding rabbits can use up to 24% CF. Also, feed crude fibre level of less than 10% CF promotes enteritis (Champe and Maurice, 1983). Energy contents were also reasonably high (2665 - 3643 Kcal/kg DM).

Commercial pig diets analysed (Table 4) had CP values ranging from 13.23% for fatteners to 22.09% for creep feed and energy from 2659 - 3244 Kcal/kg DM

Survey conducted during the study showed that feed ingredients are very much adulterated viz:- Groundnut cake with groundnut shell and sand; Fish Meal with saw dust and rice bran; and Local Fish Meal with excess bone. These findings also agree with the earlier work of Fetuga (1979). Improper and prolonged storage, seasonal feed ingredient supply, etc. are factors to recognise in feed quality changes.

Interestingly, there were differences between the analysed CP, CF and Energy values and those specified on the feed bag tags (Table 5) by as much as -1.1% to -16.05% for protein and +12.13% to 233.14% for fibre i.e implying that while protein usually fell below specified levels, the fibre was far in excess of the tagged values.

In conclusion, the results obtained in this study, to a great extent, have indicated non-conformity of feed contents with expected/recommended levels of the nutrients monitored. These have negative implications for livestock performance and, so, the livestock industry, especially in a depressed economy like ours. The tendency is therefore for manufacturers to use minimum inputs for maximum financial gains on the side of the millers thereby transferring the problem of feed efficiency to the stock owners.

In order to stem the unhealthy development associated with feed quality in the livestock industry, the following recommendations are made to cut across private and governmental sectors: (a) The levels of feedingstuffs in the market should be increased. (b) Cost of feed

TABLE 5: COMPARISON OF THE ANALYSED AND TAGGED NUTRIENT COMPOSITION OF SOME FEEDS

Feed Class/ (Miller)	CRUDE PROTEIN				CRUDE FIBRE			
	Observed Range	Mean	Tagged Content	Observed % Variation	Observed Range	Mean	Tagged Content	Observed% Variation
Broiler Starter (A)	16.71-21.98	19.42	22.0	-7.0%	5.33-6.68	6.00	5.5	+9.09
Broiler Finisher (B)	13.52-16.50	15.01	19.50	-23.03	11.08-12.24	11.66	3.5	+233.14
Chick Mash (B)	10.6-20.14	15.54	19.00	- 18.21	7.34-13.45	10.20	7.50	+37.2
Grower's Mash (D)	13.34-15.34	14.34	14.5	-1.10	12.73-14.95	13.83	7.20	+92.08
Layers Mash (B)	10.13-17.32	15.32	16.5	-7.15	10.28-14.02	12.18	6.0	+103.0
Rabbit Weaners Pellet (H)	16.44-7.14	16.79	20.00	-16.05	10.61-14.24	12.43	9.0	+38.11

ingredients should be stabilized. This could also be extended to finished feeds. (c) Quality control for feedstuffs and finished feed should been forced to reduce adulteration and, from there, maintain quality of products. (d) Information on agro-industrial by-products and new feed resources should be made known to farmers to reduce abuse and encourage proper use. (e) Review seminars should be held from time to time for farmers and feed millers to update information.

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