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PIGEON PEA SEED: LEVEL OF AWARENESS, UTILIZATION AND CONSTRAINTS TO USE AS A FEEDSTUFF AMONG LIVESTOCK FARMERS IN OGBOMOSO ZONE OF NIGERIA

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Abstract

Livestock farmers (n=253) from five local government areas of Ogbomoso, Southwest Nigeria were interviewed through a well-constructed questionnaire. This study assessed the demographic characteristics of the livestock farmers, type of livestock kept, type of feed used, energy and plant protein feedstuffs used in feed compounding, level of awareness of pigeon pea seed utilization as livestock feedstuff and constraints to the use of pigeon pea seed as livestock feedstuff. The survey results revealed that the respondents were mostly part time livestock farmers, married-middle aged men ($\bar{x}$=40 years) with an average 5 years farming experience, who kept majorly poultry and pigs (55-80%) amongst other livestock. Compounded rations (53-83%) were commonly used with maize (66-100%) as the main energy feedstuff while soybean meal (87-90%), groundnut cake (77-100%) and palm kernel cake (86-92%) were the major plant protein ingredients. Majority of the respondents (70-82%) were unaware of the potential use of pigeon pea seed as livestock feedstuff but those that were aware indicated that antinutrients and or processing (88-100%) were the serious concern for use as a feedstuff. It can therefore be recommended that agricultural extensionists should work together with livestock nutritionists and re-orient the farmers with available research outputs that have addressed this constraint.

Key words**:** *Cajanus cajan**,** livestock, feedstuff, farmers, utilization, pigeon pea seed*

INTRODUCTION

Pigeon pea (*Cajanus cajan (L.)* is a tropical and sub-tropical, leguminous, drought resistant crop majorly cultivated for its edible seeds and forage in more than 33 countries [36]. The seeds are a source of food in Asia, Africa and Latin America. World production of pigeon pea is estimated at 4.85 million tons in 2014 [24, 25]. The crop is being grown sole or inter-cropped with maize, millet, yam, cassava and sweet potato [18]. The potential of pigeon pea to mitigate the effect of climate change has been reported by [19]. They have also being reported in erosion control [15], as wind breakers and shade provider [44].

Pigeon pea seed is locally available at low cost in most Nigerian markets [20] but its low human preference attributed to long cooking time unlike other available beans and low industrial use [6] is pushing it to become unpopular, thus, on the verge of extinction in Nigeria. The seed had been reported to have a crude protein content ranging from 17%–30% [7, 20], crude fiber (CF) of 7.3%–10%, nitrogen-free extract (NFE) of 61.2%, ether extract (EE) of 1.7%–2.1% and ash of 3.1%–4.2% [5]. [10] and [20] reported that it is relatively high in lysine but low in methionine.

Pigeon pea seed offers good quality nutritional profile as a feedstuff especially for monogastrics. The seed contains antinutrients such as phytates, trypsin inhibitors, oxalate, saponins and tannins [32, 34] which have deleterious effects on various livestock species. *Cajanus cajan* contains more trypsin and chymotrypsin inhibitors than soybean seeds [30]. These antinutrients are responsible for poor protein digestibility, feed conversion ratio, growth response and villi morhometry in broilers and pigs fed of pigeon pea seed

meal [13, 27]. These harmful effects could be reduced by different processing methods such as boiling, crushing, extrusion, soaking and roasting [38, 40]. Pigeon pea seed meal has a good nutritional profile and could replace maize and soybean [6]. It could be a better and cheaper protein alternative as compared to other legume grains. Heat treatments such as cooking or extrusion reduce the amount of trypsin and chymotrypsin inhibitors and increase pigeon pea digestibility [13, 14, 42].

Processed pigeon pea seed meal has good quality crude protein content and has been found a satisfactory protein ingredient constituting about 20-30% of broiler ration, quail ration and rabbit [1, 6, 11, 12, 45], while 10% inclusion has been recommended for layer chicken [8, 9]. [28] reported that pigeon pea meal could replace up to 100% soybean meal in channel catfish diet unlike 60% replacement in nile tilapia fish diet [35]. About 12-14% inclusion of pigeon pea seed meal were reported to provide acceptable results in growing pigs [26]. Pigeon pea seed meal has been reported as a protein supplement in ruminant (dairy cows, beef cattle,) diets at higher inclusion rates because they are highly digestible and supply high quality protein [17].

Therefore, since the tolerable levels of pigeon pea seed meal has been established for use in the diets of various livestocks, the level of awareness, acceptance and use among livestock farmers has to be established.

MATERIALS AND METHODS

Livestock farmers (n=253) were randomly interviewed using pre-constructed questionnaire at the available feedmills across the five Local Government Areas (LGAs) of Ogbomoso, Southwest, Nigeria. The selection was not evenly distributed because of the uneven distribution of feedmills and livestock farmers across and within Ogbomoso zone: Ogbomoso North, Ogbomoso South, Surulere, Oriire and Ogo Oluwa. The questionnaire was used to examine the demographic characteristics of the livestock farmers, type of livestock kept, type of feed used, energy and plant protein feedstuffs used in feed compounding, level of awareness of pigeon pea seed utilization as livestock feedsfuff, and constraints to the use of pigeon pea seed as livestock feedstuff. The respondents include 61 in Ogbomoso North, 90 in Ogbomoso South, 35 in Surulere, 34 in Oriire and 33 in OgoOluwa. The data collected were analysed using descriptive statistics including frequency count and percentage.

RESULTS AND DISCUSSIONS

Demographic characteristics of the respondents

The demographic characteristics of the respondents are shown on Table 1. Most of the farmers are middle aged with a mean of 40 years, mostly married men with an average of 4 persons in a household. They generally had an average of 5 years farming experience and are mostly part-time farmers with a mean income of ₦756,000 annually. This implies that most of the respondent are youths and are in their active years. This supports the findings of [3] and [29], that people within the labour force of any nation are usually active, dynamic, energetic and creative. This is unlike the report of [31] that average age of an indian farmer is 50.1 years [33], that of a US farmer is 58 years [46], Japanese farmer is 67 years while that of European farmer is more than 65 years. The age observed for farmers in the study area may be attributed to unemployment rate because the only sector that could engage many people at a time is agriculture. This may be the reason why most of the respondents were part time farmers. Men are more involved in primary agricultural production because of the energy demanding nature while the women are more engaged with food processing and marketing [43]. The farming experience revealed that majority of the respondents are new entrants engaged in other occupation as also observed by [37] and as such may not be aware of alternative feedstuffs. The drift of youths towards livestock farming may have been informed because of the increased demand for livestock products and under employment. This is also obvious from the annual income that most of the respondents are subsistence farmers which

are a characteristic of Africa agricultural sectors [23].

Table 1. Demographic characteristics of the respondents

Characteristics	NORTH (n=61)	SOUTH (n=90)	SURULERE (n=35)	ORIIRE (n=34)	OGOOLUWA (n=33)	Mean
Age (years)						
20-25	3(4.92)	14(15.56)	2(5.71)	0(0.00)	1(3.03)	40
26-30	12(19.67)	27(30.00)	4(11.43)	6(17.65)	11(3.33)	
31-35	13(21.31)	18(20.00)	7(20.00)	6(17.65)	6(18.18)	
36-40	14(22.95)	12(13.33)	11(31.43)	6(17.65)	9(27.27)	
46-50	11(18.03)	10(11.11)	6(17.14)	8(23.53)	4(12.12)	
51-55	3(4.92)	7(7.78)	3(8.57)	4(11.76)	2(6.06)	
56-60	5(8.20)	2(2.22)	1(2.86)	4(11.76)	0(0.00)	
Gender						
Male	53(86.89)	80(88.89)	31(88.57)	30(88.24)	27(81.82)	
Female	8(13.11)	10(11.11)	4(11.42)	4(11.76)	6(18.18)	
Marital status						
Single	13(21.31)	36(40.00)	4(1.43)	4(11.76)	8(24.24)	
Married	44(72.13)	52(57.78)	26(74.23)	30(88.24)	24(72.72)	
Divorce	3 (4.92)	1(1.11)	3(8.57)	0(0.00)	0(0.00)	
Widowed	1(1.64)	1(1.11)	2(5.71)	0(0.00)	1(3.03)	
Household size						
1-5	52(82.25)	74(82.22)	28(80.00)	28(82.35)	24(72.73)	4
6-9	9(14.75)	16(17.78)	7(20.00)	6(17.65)	9(27.27)	
Farming experience						
1-5years	46(75.41)	62(68.89)	21(60.00)	18(52.94)	15(45.45)	5
6-10years	13(21.31)	23(25.56)	10(28.57)	6(17.65)	12(36.36)	
11-15years	1(1.64)	4(4.44)	2(5.71)	6(17.65)	6(18.18)	
16-20years	1(1.64)	1(1.11)	2(5.71)	4(11.76)	0(0.00)	
Full/Part time						
Full time	21(34.43)	28(31.11)	16(45.71)	20(58.82)	13(39.39)	
Part time	40(65.57)	62(68.89)	19(54.29)	14(41.18)	20(60.61)	
Annual income (₦'000)						
1-50	10(16.39)	14(15.56)	4(11.43)	4(11.76)	6(18.18)	756
51-100	15(24.59)	18(20.00)	4(11.43)	2(5.88)	4(12.12)	
101-200	4(6.56)	8(8.89)	1(2.86)	7(20.59)	4(12.12)	
201-500	16(26.23)	37(41.11)	10(28.57)	9(26.47)	13(39.39)	
501-1,000	11(18.03)	9(10.00)	7(20.00)	4(11.76)	3(9.09)	
>1,000	5(8.20)	4(4.44)	9(25.71)	8(23.53	3(9.09)	

Source: Field Survey, 2018.
(Percentages are in parenthesis)

Livestock kept by the respondents

Distribution of respondents based on type of livestock kept is shown on Table 2. The farmers kept monogastric animals like poultry birds and pigs; pseudo-ruminant like rabbits; ruminants like goat, sheep and cattle; fishes and micro-livestock like snail in varying combinations within each local governments varies. In all the local governments, majority (>54%) of the farmers rear poultry birds and pigs. For instance, 68.85%, 56.67%, 80.00%, 76.47% and 57.58% of the farmers kept poultry birds while 60.94%, 55.56%, 80.00%, 58.82% and 54.55% of the respondents kept Pigs in Ogbomoso North, Ogbomoso South, Surulere, Oriire and Ogooluwa respectively. Moreover, 16.39%, 12.22%, 8.57%, 14.71% and 6.06% of the respondents kept rabbit in Ogbomoso North, Ogbomoso South, Surulere, Oriire and Ogooluwa respectively, while 11.48%, 12.22%, 40.00%, 17.65% and 18.18% of the respondents kept goats in Ogbomoso North, Ogbomoso South, Surulere, Oriire and Ogooluwa respectively. Also, 8.20%, 6.67%, 20.00%, 17.65% and 6.06% of the respondents kept sheep in Ogbomoso North, Ogbomoso South, Surulere, Oriire and Ogooluwa respectively. However, 1.64%, 1.11%, 2.86%, 11.76% and 3.03% of the respondents kept cattle in Ogbomoso North,

Ogbomoso South, Surulere, Oriire and Ogooluwa respectively, while 4.92% and 1.11% of the respondents kept fish in Ogbomoso North and Ogbomoso South respectively. Similarly, 1.64% and 1.11% of the respondents kept snail in Ogbomoso North and Ogbomoso South respectively.

This shows that the respondents kept poultry and pigs more than other livestock in these areas. This could be attributed to the growing attention that poultry and pig production have received over the years in Nigeria especially in southern part where religious taboo does not hold sway against pigs. Also, quick return on investment, ability to attain market weight within short period [21] may have contributed to the choice of enterprise. Also, [22] attested that poultry and pig production are the fastest growing livestock subsector in the world and [41] reported that the growth occurs mostly in developing nations.

Table 2. Livestocks kept by the respondents

Livestock	NORTH (n=61)	SOUTH (n=90)	SURULERE (n=35)	ORIIRE (n=34)	OGOOLUWA (n=33)
Poultry	42(68.85)	51(56.67)	28(80.00)	26(76.47)	19(57.58)
Pig	26(60.94)	50(55.56)	28(80.00)	20(58.82)	18(54.55)
Rabbit	10(16.39)	11(12.22)	3(8.57)	5(14.71)	2(6.06)
Goat	7(11.48)	11(12.22)	14(40.00)	6(17.65)	6(18.18)
Sheep	5(8.20)	6(6.67)	7(20.00)	6(17.65)	2(6.06)
Cattle	1(1.64)	1(1.11)	1(2.86)	4(11.76)	1(3.03)
Fish	3(4.92)	1(1.11)	0(0.00)	0(0.00)	0(0.00)
Snail	1(1.64)	1(1.11)	0(0.00)	0(0.00)	1(3.03)

Source: Field Survey, 2018.
(Percentages are in parenthesis)
*Multiple Response

Identification of the commonly used feed types and feedstuffs

Farmers have options between finished feeds from different companies and compounded ration from available local feedstuffs (Figure 1). Although, there were multiple responses, however, in Ogbomoso North, 55.74% of the respondents used compounded feed for their livestock while 44.26% of the respondents used finished feeds. In Ogbomoso South, 53.33% of the respondents used compound feeds while 46.76% of the respondents used finished feeds.

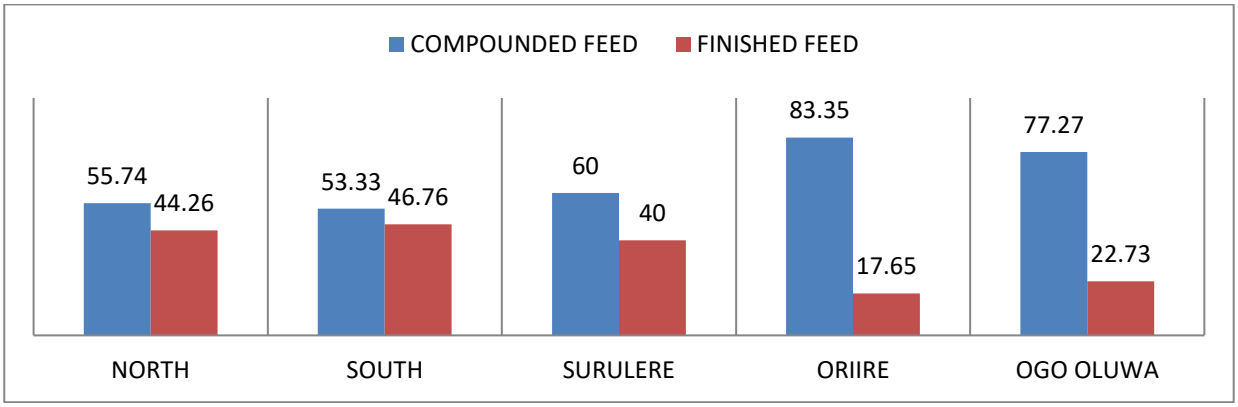

Fig. 1. Feed type use by the livestock farmers (%)
Source: Field Survey, 2018.
*Multiple Responses

In Surulere Local Government 60.00% of the respondent used compounded feeds while 40.00% of the respondents used finished feeds. In Oriire Local Government, 83.35% of the respondents used compound feeds while 17.65% of the respondents used finished feed. In Ogo-oluwa Local 77.27% used compound

feeds while 22.73% of the respondents used finished feeds.

This implies that majority of the respondents from the study are used compounded feed compared to finished feeds for feeding their livestock. This could positively impact the rate of adoption of new technologies in feed formulation. Thus, in a bid to formulate their own feed the respondents would have sought to use cheap but effective feedstuffs available. Observable from the animal kept is that the major livestock reared are monogastrics which depend on formulated feeds. This supports the earlier findings of [16].

Energy Feedstuff Used in compounding Livestock feed

The respondents gave the energy feedstuffs used when compounding their livestock feed (Figure 2). Multiple responses were given by the farmers. In all the five LGAs, maize was the major energy feedstuff while sorghum which is also grain cereal and cassava peel were seldomly used. This showed that majority of the livestock farmers use maize as an energy feedstuff. This could have resulted from availability, ease of handling and nutrient composition as observed by [16]. This could limit the awareness and use of other feedstuffs by the livestock farmers. However, [39, 40] had demonstrated that sorghum and cassava can be used in poultry diets but the farmers may be unaware.

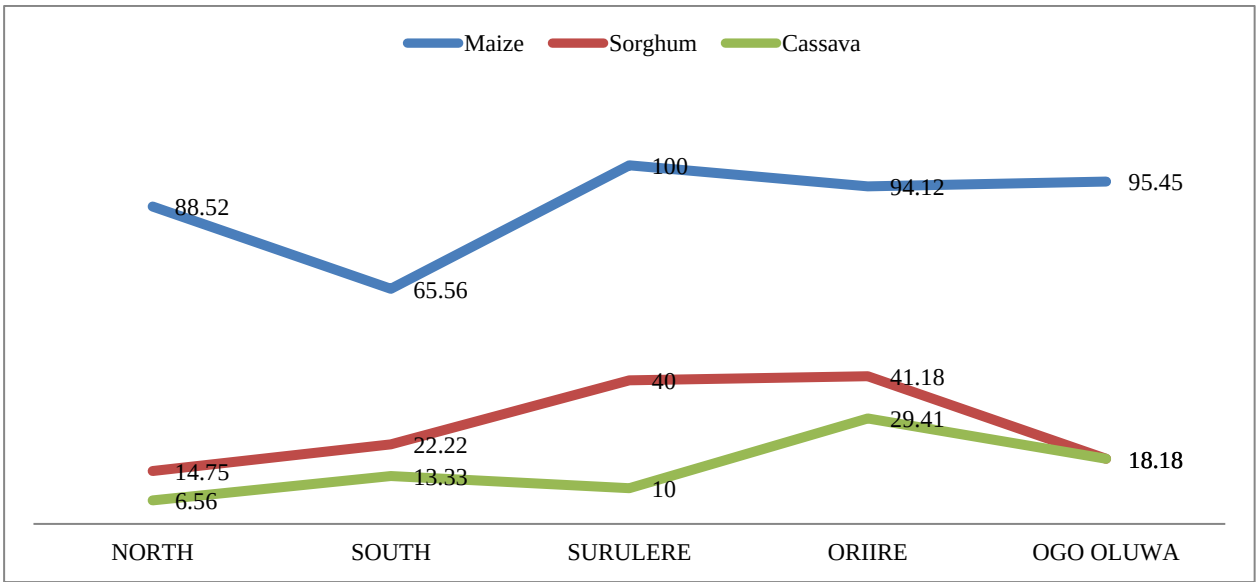

Fig. 2. Major energy feedstuff used in feed formulation
Source: Field Survey, 2018.
*Multiple Responses

Plant Protein Feedstuff Used in compounding Livestock feed

Figure 3 shows the plant protein feedstuffs used in compounding livestock feed. From the multiple response given by the respondents from the five LGAs, Soybean meal, groundnut cake and palm kernel cake were the major plant protein feedstuff while pigeon pea seed meal were unpopular. Soybean meal and groundnut cake are convectional feedstuffs but their price has led researchers to look for alternatives [38] Observation on palm kernel cake use from this study may not be unconnected use as a major feedstuff for pig farmers [4].

The use of pigeon pea seed as an alternative plant protein may be because of the availability as observed by [16] for maize. This could limit the awareness and use of pigeon pea seed as feedstuffs by the livestock farmers. [2] had demonstrated that processed African yam bean and pigeon pea seed can be used in poultry diets but the farmers may be unaware.

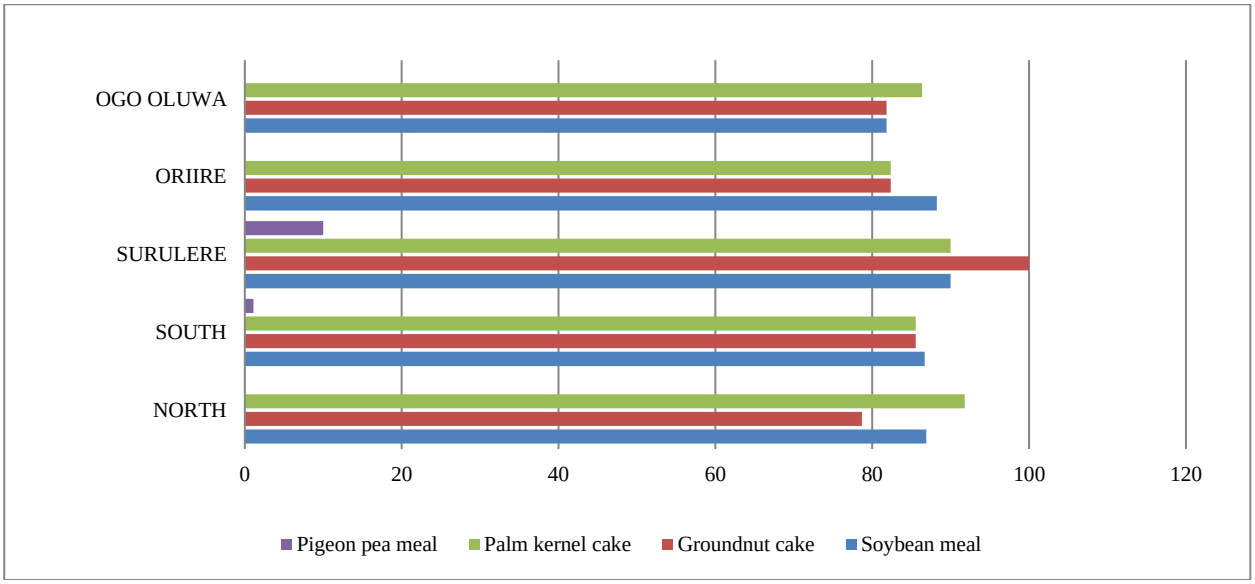

Fig. 3. Major plant protein feedstuffs used by the farmers (%)
Source: Field Survey, 2018.
*Multiple Responses

Assessment of the Level of Awareness of Utilization of Pigeon pea seed as Livestock Feedstuff

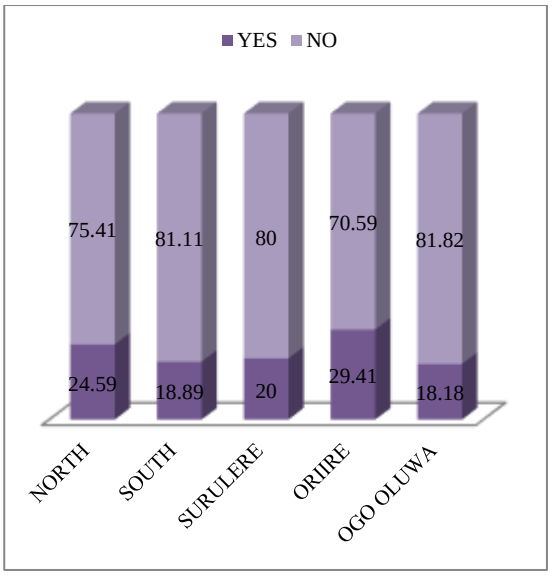

Fig. 4. Distribution of Respondent (%) Based on Awareness of Pigeon pea seed as a feedstuff
Source: Field Survey, 2018.

Figure 4 shows the distribution of respondent based on awareness of Pigeon pea seed as a livestock feedstuff. 24.59%, 18.89%, 20.00%, 29.41% and 18.18% of the farmers in Ogbomoso north, Ogbomoso South, Surulere, Oriire and Ogooluwa respectively agreed to be aware of potentials of Pigeon pea seed as a feedstuff while 75.41%, 81.11%, 80.00%, 70.59% and 81.82% from the same LGAs were unaware.

This implies that majority of the respondents were unaware of the potential use of Pigeon pea seed as livestock feedstuff.

This shows that despite the researches on nutritional profile and demonstration of use by various researchers [2, 6, 7, 20], most farmers in the study area are unaware.

Constraints to the use of Pigeon pea seed as livestock feedstuffs

Constraints to the use of Pigeon pea seed as livestock feedstuffs is shown on Table 3. Factors identified are availability, ease of use, nutrient quality, cost, quantity needed and presence of antinutrients and or processing. 93.33%, 88.24%, 100.00%, 100.00% and 100.00% from Ogbomoso north, Ogbomoso south, Surulere, Oriire and Ogooluwa identified antinutrients and or processing as the major constraint. [16] identified water content, dustiness and cost of processing as constraints for cassava peel use in livestock diet but these may not be applicable for pigeon pea seed except cost of processing.

Table 3. Constraints to the use of pigeon pea seed meal as a feedstuff based on level of awareness

Constaints	NORTH (n=15)	SOUTH (n=17)	SURULERE (n=7)	ORIIRE (n=10)	OGOOLUWA (n=6)
Availability	0(0.00)	1(5.88)	0(0.00)	0(0.00)	0(0.00)
Ease of use	0(0.00)	0(0.00)	0(0.00)	1(10.00)	1(16.67)
Nutrient quality	1(6.67)	0(0.00)	0(0.00)	1(10.00)	0(0.00)
Cost	0(0.00)	0(0.00)	0(0.00)	0(0.00)	0(0.00)
Quantity needed	0(0.00)	1(5.88)	0(0.00)	0(0.00)	0(0.00)
Antinutrients/ Processing	14(93.33)	15(88.24)	7(100.00)	10(100.00)	6(100.00)

Source: Field Survey, 2018.
*Multiple Responses

CONCLUSIONS

Livestock farmers in Ogbomoso zone, southwest Nigeria were mostly part time, married-middle aged men with an average of 5 years farming experience. They kept majorly monogastrics: poultry and pigs. Although, they also kept goat, sheep and other mini-livestocks in small quantity. Compounded rations were most commonly used with maize as the main energy feedstuff while soybean meal, groundnut cake and palm kernel cake were the major plant protein ingredient.

Majority of the respondents were unaware of the potential use of pigeon pea seed as livestock feedstuff but those that were aware indicated that antinutrients and or processing were the serious concern for use as a feedstuff. It can therefore be recommended that agricultural extensionists should work together with livestock nutritionists and re-orient the farmers with available research outputs that have addressed this constraint.

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