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Gender assessment of pig farmers' preference for training logistics in the use of cassava plant meal in the diet for pigs in South-West Nigeria

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SUMMARY

Gender has not received much attention in training logistics despite its importance for achieving equal access to information on proven innovations and the uptake by farmers. The paper assessed male and female pig farmers' preference for training logistics, analysed the proximate composition and cost of cassava plant meal and the common feedstuffs. It determined the levels of awareness in alternative feeds by gender, and discussed farmers' training constraints. Purposive sampling technique was used to select two States and six Local Government Areas based on the preponderance of pig farmers. Structured interview schedule was administered on 300 pig farmers and 18 key informants identified through snow ball sampling technique. Data were subjected to descriptive and inferential statistics. Results include nutritional and cost advantages of cassava plant meal, over 80 % of both gender in their active ages, both gender had high level of awareness in alternative feeds and similarities in preferences for training methods, mode and facilitator. They differ in preferences for training venue, duration, day and time. Results of ANOVA revealed that male and female farmers' preferences for training logistics differ significantly ($p < 0.05$). In conclusion, farmers' preference for training logistics was largely determined by cultural diversity in gender relations which if not considered could widen gender gap in access to information on agricultural innovations and hinder improved pig production.

Palabras clave

Producción porcina.
Harina de yucca.
Preferencia de los agricultores.
Logística de formación.
Piensos alternativos.
Maíz.

Evaluación de género de la preferencia de los agricultores de cerdos para la formación de la logística en el uso de la comida de plantas de yuca en dietas para cerdos en Nigeria del suroeste

RESUMEN

El género en la logística de la capacitación no ha recibido igual atención que otros aspectos del diseño de la capacitación a pesar de su importancia en el acceso a la información sobre innovaciones probadas y la aceptación por parte de los agricultores. El documento evaluó la preferencia de los agricultores porcinos y hembras por la logística de la capacitación, analizó la composición y el costo de la harina de yuca y los piensos comunes. Determinó los niveles de conciencia en las alimentaciones alternativas por género y discutió las limitaciones de capacitación de los agricultores. La técnica de muestreo intencional se utilizó para seleccionar dos estados y seis áreas de gobierno local en función de la preponderancia de los criadores de cerdos. El programa de entrevistas estructuradas se administró a 300 criadores de cerdos y a 18 informantes clave identificados mediante la técnica de muestreo de bolas de nieve. Los datos fueron sometidos a estadística descriptiva e inferencial. Los resultados incluyen las ventajas nutricionales y de costo de la harina de yuca, la mayoría de los encuestados en su edad activa, ambos sexos tuvieron un alto nivel de conciencia en alimentos alternativos y similitudes en las preferencias para los métodos de capacitación, el modo y el facilitador. Se diferencian en las preferencias para el lugar de entrenamiento, la duración, el día y la hora. Los resultados de ANOVA revelaron que las preferencias de los agricultores y las agricultoras por la logística de capacitación difieren significativamente ($p < 0.05$). En conclusión, la preferencia de los agricultores por la logística de la capacitación estuvo determinada en gran medida por la diversidad cultural y las relaciones de género que, de no ser consideradas en el diseño de la capacitación, podrían ampliar la brecha de género en el acceso a la información sobre innovaciones agrícolas y dificultar la mejora de la producción porcina.

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INTRODUCTION

Malnutrition due to poor protein intake and hunger is well documented globally, with worse case evidences recorded in sub-Saharan Africa (Akombi et al. 2017; FAO/IFAD/WFP 2013; Leroy et al. 2014). Nigeria inclusive. In the Global Food Security Index (2015, p. 10) reports, Nigeria ranked 91st out of 109 countries assessed based on food affordability, availability, quality and quantity of protein intake which was 64 g/day on the average (Iyangbe & Orewa 2009). Efforts to increase animal food availability and accessibility at reduced cost to enhance protein intake are directed towards pig production.

Pork is highly acceptable and relished in the humid tropics of Nigeria (Halimani et al. 2007) wherever it is permitted by religion. Among the livestock raised in Nigeria, pig distinctly possess the potentials of high prolificacy, fast-growing and good converter of feed to meat. In the traditional society, the ownership, management and control of livestock such as pig was dominated by women who basically rear them in the backyard (Chiduwa et al. 2007; FAO 2012; Herrero et al. 2010) to complement household income. With increasing demand for food derived from animal origin, livestock production system has become more commercialised and male dominated (Assan, 2014, p. 127; Oluka et al. 2009). This marks a transition stage in livestock production system with accompanied challenges which include feed deficits, erratic supply of feed ingredients and competition between human and pigs for available feed resources (Amaefule et al. 2006, p. 244; Halimani et al. 2007) particularly maize. Consequently, the cost of feed accounted for over 70 percent of the total cost of livestock production in Nigeria (Longe 2006).

In order to find cheaper alternative dietary sources of energy in the diets of pigs, most farmers engage in traditional knowledge system for pig production, using locally available feed resources mainly agricultural by-products such as plantain, cassava and yam peels as well as other domestic and farm wastes (Phengsavanh et al. 2010, p. 1628; Zijlstra & Beltranena 2009, p. 229). These alternative feedstuffs are characterized with high calories and fibre but low in crude protein and have been widely reported to reduce voluntary feed intake, nutrient digestibility and growth performance in pigs (Berrocoso et al. 2015, p. 3919; Mateos et al. 2007, p. 101).

The need to improve the nutritional profile of cassava meal as suitable replacement for common alternative feedstuffs including maize in the diets of different classes of pig informed the development of composite cassava plant meal (unpeeled roots + leaves + tender cassava stem) by Akinfala and Tewe (2001). Further studies by Akinfala, Adegbaju and Ilori (2013, p. 16); Adeyemi and Akinfala (2018, p. 427) confirmed Cassava Plant Meal (CPM) as an acceptable replacement for maize. Also, there was a recent study (Adeyemi 2018) on the effects of feeding graded levels of CPM as replacement for maize in the diets of growing-finishing pigs to enhance growth and low cholesterol content which are often desired by farmers and consumers. The research outcome includes improved growth, reduced cost of production and lean carcass. In spite of these numerous research outcomes, farmers continue to engage in the use of alternative feedstuffs based on indigenous knowledge which is characterized with many nutritional inadequacies.

Studies in many developing countries of South America and sub-Saharan Africa (Faborode & Ajayi 2015, p. 82; Sewnet, Elemo & Darsos 2016, p. 119) have attributed low knowledge and utilization of research outcomes in agriculture by rural farmers to weak linkages among researchers, extension, farmers and input providers. This stimulated the need to focus on training as a veritable tool to link farmers with researchers on innovations to improve production and economic returns with gender in focus.

Training is defined as a learning process through which trainees acquire knowledge, skills, experience and attitudes needed to perform better for the achievement of a desired goal (Jasim et al. 2016; Ngirwa 2009) and a planned program designed to improve performance with measurable changes in knowledge, skill, attitude and/or social behaviour at the individual or group levels (Harrison 2005). Training has immense potentials in the transfer and utilisation of latest technical know-how for capacity building to enhance performance and enable the trainees meet their needs and expected learning outcomes. Undoubtedly, trainings have been organised for farmers by extension and other change agents but often depended on design which has little or no consideration for the differences between male and female in training logistics. Consequently, the women are mostly disadvantaged and this constitutes gender gap in training design

Importantly, trainees' willingness to invest time and money in training programme depends on quality of the design with basically five main components: learning outcomes, training materials, trainers and content experts and the logistics (TMDG 2012, p. 23). Training logistics include training methods, mode, venue, duration and days of the week used for training and these are gender related issues which are greatly influenced by culturally prescribed roles in rural households. For a more successful training, trainers must address the limited range of occupations in which both gender particularly the women currently receive training, and the quality of training (Fawcett & Howden 1998, p. 1).

Studies by Nallari and Griffith (2011, p. 7); Temesgen, Hinde and Yusuf (2015, p. 73) revealed that women are disproportionately affected by widening inequality than men in skill acquisition, education and wages. Although, the training needs of farmers have been widely researched but information relating to male and female decisions on logistics have not been properly documented. These are closely related to issues that affect gender roles in farm families which could have implication in many agricultural training programmes and the evident wide gender gap in access to production resources including vital information.

Gender is the quality or characteristics that society ascribes to each sex (FAO 2012, p. 6). It also refers to the socially constructed behavioural norms and responsibilities for men and women (Deji 2012, p. 21). Therefore, gender issues focus not only on women, but also on the relationship between men and women, their roles, access to and control over resources, and division of labour and needs (Deji 2012, p. 22; IFAD 2009, p. 1). Available evidence revealed that productivity of women farmer is hindered by inappropriate training with consequent low priority for provision of better and impactful services (Temesgen Hinde & Yusuf 2015, p. 67).

The critical importance of training male and female farmers to increase agricultural production, promote gender equality, rural development and reduce poverty has been explored in many countries including Nigeria and Ethiopia (Collett & Gale 2009, p. 7; Ministry

of Finance and Economic Development 2010, p. 10). Studies (Nallari & Griffith, 2011 p. 7; Temesgen Hinde & Yusuf 2015, p. 73) have shown that fewer women than men participate in training programmes.

Therefore, to reduce the gender gap in access to information on research results, increase pig production, acceptability and affordability of pork, there is the need to assess male and female pig farmers' preference for training logistics in composite cassava plant as replacement for conventional feedstuffs in the diets of growing pigs. Also, the study analysed the proximate contents and cost benefit ratios of CPM and common alternative feedstuffs, described the socio-economic characteristics of pig farmers, assessed the levels of awareness on alternative feedstuffs and the constraints encountered during training by male and female farmers.

MATERIALS AND METHODS

Study Area

The study was conducted in Ondo and Osun States, Nigeria. Ondo State was created in February, 1976 with the capital in Akure, land area of 14,769 square kilometres and a population of 3,460,877 people (NPC 2006). The state lies between latitudes 5º 45′ N and 8º 15′ N and longitudes 4º 00′ E and 6º 00′ E. Osun state was created in August 1991 with the capital in Osogbo. It covers an area of approximately 14,875 square kilometres with a population of 3,416,959 (NPC 2006). The state lies between latitude 7° 30′ 0″ N and longitude 4° 30′ 0″ E. Ondo and Osun states have large expanse of arable and rich fertile soils with the occupants engaging primarily in agriculture at subsistence level.

Sampling procedure and sample size

Purposive sampling technique was used to select two states (Ondo and Osun) from the six states of South-west Nigeria based on the preponderance of pig farming. From each of the states selected, three Local Government Areas (LGAs) (Ife Central, East and North as well as Akoko South West, North West and North East) were purposively selected based on the preponderance of pig farms to make a total of six LGAs. Thereafter, snowball sampling technique (a sampling technique where a respondent who raises pigs served as a link to other respondents) was used to identify fifty pig farmers from each of the LGAs to make a total of 300 respondents and two key informants from each of the nine communities to make a total of 18.

Also, samples of commonly used feedstuffs (maize, cassava peel, plantain peel and palm kernel cake) collected across different farms were compared with cassava plant meal to assess their nutrient contents. The feed samples were oven dried at 40 ºC for 3 days to allow drying. They were grinded using locally made pestle and mortar to break the large lumps into smaller particles. Representative samples were taken from each of the feedstuffs for proximate analysis following the procedures of AOAC (2005) to determine the contents of crude protein, fibre, ether extract, ash and nitrogen free extract while feed cost per kilogram was evaluated based on the prevailing market price, labour cost and other inputs.

Instrumentation and validity of instrument

A well-structured interview schedule adequately validated and pretested (r = 0.78) as well as key informant guide were developed for data collection.

Data Analysis

Data were analysed using descriptive and inferential statistics. Analysis of Variance (ANOVA) was used to test the hypothesis of the study. The socio-economic variables relating to pig farmers were studied. Also, pig farmers' preference for training logistics (training methods, mode of training, training venue, language used for training, training duration, period of training, days in the week, time of the day for training and sex of facilitator) in the use of composite cassava plant meal (sun-dried unpeeled cassava tubers + sundried cassava leaf + sundried tender cassava stem) as replacement for maize in the diets of growing pigs were scored on a five-point Likert scale of most preferred (5), preferred (4), Indifferent (3), least preferred (2) and not preferred (1). These were used for measuring their responses for training methods, mode, venue, time of the year, day and preferred sex of facilitator. Awareness scores for the statements were computed and divided by the number of variables to obtain the mean scores. The levels of awareness were obtained by subtracting the maximum from the minimum scores, the difference was divided by three and the value obtained was added to the least value of the scale. Values lower than/equal to 2.33 was adjudged low, between 2.34 and 3.67 was moderate, and 3.68 and above was adjudged high level of awareness.

RESULTS

Proximate composition and cost benefit ratio of feed samples

The results of proximate composition of feed samples shown in **Table I** revealed that the nitrogen free extract contents of all the analysed feed samples had comparable values. Similarly, the crude protein content was comparable in all except for the value obtained for cassava peel. However, the crude fibre content of the feed samples were numerically different with maize and cassava plant meal having similar values while cassava peel, plantain peel and palm kernel cake had high crude fibre content. The feed cost per kilogram diets were significantly different ($p < 0.05$) with maize as the most expensive although there was no significant difference ($p > 0.05$) in the values obtained for cassava and plantain peels.

Socio-economic characteristics of pig farmers

The results in **Table II** showed that more male than female were involved in pig farming enterprise. Most of the respondents were below 45 year of age, had formal education, married, had small family size and earned less than ten thousand Naira monthly income from pig farming enterprise. Results in **Table II** also showed that the pig farmers had many years of pig farming experience, raised pig mainly for commer-

cial purposes and with small herd size. Substantial proportion of the farmers feed their animals twice with mainly common alternative feedstuffs and their sources of information on alternative feedstuffs were mainly friends/family members, market places, religious groups and radio.

Levels of awareness of male and female farmers on the use of alternative feed resources

ters, while most males chose farms and homes. Also, the training duration preferred by most females were hours and days while the males preferred days and hours. The days of the week preferred by most of the females were Sunday, Saturday and Friday, while the males preferred Saturday, Friday and Sunday. Similarly, majority of the females preferred evening to afternoon and morning while the males preferred afternoon

Tabla I. Approximate composition and cost analysis of cassava plant flour and common energy-feeding ingredients (Composición aproximada y análisis de costos de harina de plantas de yuca e ingredientes comunes de alimentación energética).

Parameters (on DM basis)	Maize	CPM	CP	PP	PKC
Crude protein	10.38	12.51	4.67	16.81	18.36
Crude fibre	2.57	5.18	12.77	15.98	19.82
Ether extract	4.53	3.43	1.54	3.83	7.59
Ash	2.82	6.15	5.69	17.80	4.12
Nitrogen Free Extract	67.75	72.73	68.28	52.80	50.26
Feed cost/kg (₦)	180.0[a]	64.25[c]	46.0[d]	43.54[d]	70.0[b]

[abcd] means in the same row having different superscripts differ at p <0.05. CPM cassava plant meal; CP cassava peel; PP plantain peel; PKC palm kernel cake. ₦360.5 = 1 USD; ₦ - Nigerian Naira

The levels of awareness as depicted in **Figure 1** below indicate that fewer numbers of both gender with more male than female had moderate level with scores ranging from 2.33 to 3.67 out of the expected maximum score of 5.0. Also, majority of both gender had high level of awareness with scores above 3.67 and none had low level of awareness.

Male and female preference for training logistics

Results in **Table III** revealed gender differences and similarities in preferences for the different areas of training logistics by ranking order. The training venue preferred by most of the females were village centres, religious centres and the Local Government Headquar-

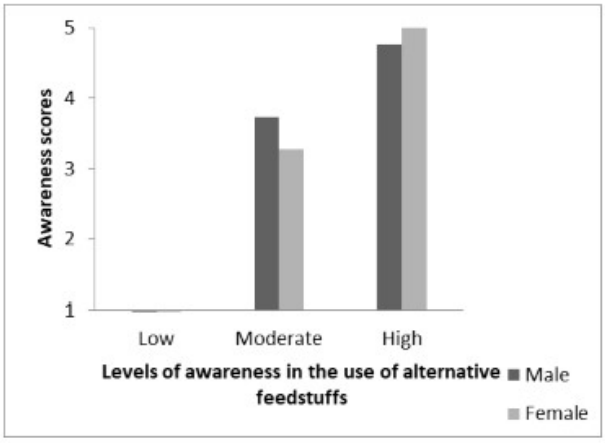

Figure 1. Distribution of male and female respondents' levels of awareness in the use of alternative feed stuffs in pigs' diets (Distribución de los niveles de conciencia de los encuestados y las mujeres en el uso de piensos alternativos en las dietas de los cerdos).

time for training programmes. Furthermore, results revealed that the preferred options by both gender were practical demonstration for training methods, group for mode of training, Yoruba language for training and after office/farm hours for period of training. For the choice of training facilitator, both gender ranked male first and female second (**Figure 1**).

Constraints encountered by male and female farmers during training programmes

Some of the common challenges (twenty-two constraints) facing male and female farmers in training programmes are shown in **Table IV**. The major constraints indicated by the male farmers were five in number while those of the females were twelve. Others were eight minor constraints for male and three for female. Similarly, nine and seven of the constraints were not identified by male and female respondents respectively.

The results of regression analysis in **Table V** revealed that age ($t=2.117$; $p<0.05$), household size ($t=-2.000$; $p<0.05$), farming experience ($t=-3.727$; $p<0.01$) and feeding frequency of pigs ($t=2.716$; $p<0.01$) had significant relationship with farmers preferences for training logistics.

The negative significance of household and farming experience is an indication that the higher the household size and experience in pig farming, the lesser is their preference for training logistics. The summary of the overall results showed that the regression model accounted for 59.7 percent variation in the dependent variable with F value of 14.996 and R^2 value of 0.597. This means that the significant variables explain 59.7 % of pig farmers' preference for training logistics. Therefore, these variables should be given utmost priority in the design of training programmes for pig farmers

Tabla II. Socio-economic and farming characteristics of farmers (Características socioeconómicas y relacionadas con la agricultura de los agricultores)**.**

	Male		Female		
Variables	Frequency	Percentage	Frequency	Percentage	Mean±SD
Sex	205	68.3	95	31.6	
Age (Years)					
≤ 35	115	56.1	24	25.3	
36 – 45	55	26.9	39	40.5	
46 – 55	13	6.4	14	15.2	
56 – 65	18	8.8	18	19.0	
≥ 65	4	1.8	-	-	33.6 ± 7.15
Educational level					
Not literate	32	15.8	16	16.5	
Primary education	46	22.2	24	25.3	
Secondary education	86	42.1	36	38.0	
Tertiary	41	19.9	19	20.2	
Household size					
< 5	194	94.8	85	89.4	
≥ 5	11	5.2	10	10.6	3.60±1.83
Monthly income from pig farming					
≤ ₦10,000	104	50.9	53	55.7	
₦11,000 – 20,000	65	31.6	32	34.2	
₦21,000 – 50,000	36	17.5	10	10.1	₦9,603.1±10
Experience (Years)					
≤ 10	158	77.2	57	59.5	
11-20	28	13.5	25	26.6	
>20	19	9.3	13	13.9	8.13±4.09
Reason for raising pig					
Consumption	12	5.8	4	3.8	
Sales	185	90.1	84	88.6	
Gift	8	4.1	7	7.6	
Herd size					
≤ 10	108	52.6	53	55.7	
11 – 20	69	33.9	35	36.7	
> 20	28	13.5	7	7.6	9.84±2.45
Feeding frequency					
1	36	17.5	22	22.8	
2	141	69.0	61	64.5	
3	28	13.5	12	12.7	2.04±0.57
*Types of feed fed to pigs					
Conventional	34	16.4	6	6.3	
Alternative	174	84.8	72	75.9	
Alternative and conventional	58	28.1	30	31.7	
*Sources of information on alternative feedstuffs					
Family members	96	46.8	84	88.6	
Friends/fellow farmers	200	97.7	54	57.0	
Extension agents	23	11.1	36	38.0	
Religious groups	88	42.7	67	70.9	
Radio	126	61.4	38	40.5	
Market places	18	8.8	84	88.6	

*Multiple responses SD – Standard Deviation

Tabla III. Gender disaggregated table on preference for training logistics (Cuadro desglosado por género sobre la preferencia por la logística de capacitación).

	Male		Female	
Variables	Mean	Ranking	Mean	Ranking
Training methods				
Practical demonstration	4.42	1st	4.14	1st
Printed material	1.9	4th	2.53	2nd
Lecture/discussion	1.74	2nd	2.20	3rd
Audio-visual	1.66	3rd	1.34	4th
Radio	1.30	5th	1.08	5th
Mode of training				
Group	4.59	1st	4.20	1st
One-on-one	3.50	2nd	2.15	3rd
Selective (group)	2.62	3rd	2.52	2nd
Collective/general	1.90	4th	1.91	4th
Training venue				
Farm	4.30	1st	1.82	4th
Home	3.76	2nd	1.48	5th
Village centre	2.50	3rd	4.79	1st
Local Government headquarter	2.30	4th	3.24	3rd
Religious centre	1.40	6th	4.03	2nd
Office	1.42	5th	0.86	6th
Language of training				
Yoruba	4.80	1st	5.0	1st
Local dialect	1.68	2nd	1.75	2nd
Igbo	1.40	3rd	1.69	3rd
Hausa	1.22	4th	1.54	4th
Training duration				
Days	4.10	1st	3.20	2nd
Hours	3.41	2nd	4.72	1st
Weeks	2.02	3rd	1.58	3rd
Month	1.56	4th	1.01	4th
Period of training				
After office/farm hours	4.74	1st	4.50	1st
Off farm season	3.0	2nd	3.43	2nd
End of farming season	2.86	3rd	1.63	3rd
Beginning of farming season	1.02	4th	1.25	4th
Days for training				
Saturday	4.50	1st	3.00	2nd
Friday	3.00	2nd	2.78	3rd
Sunday	2.50	3rd	4.24	1st
Wednesday	1.64	5th	1.20	6th
Thursday	1.69	4th	1.53	4th
Monday	1.33	6th	1.27	5th
Tuesday	1.02	7th	1.16	7th
Time of the day for training				
Afternoon	4.77	1st	2.91	2nd
Evening	3.09	2nd	4.05	1st
Morning	2.20	3rd	1.48	3rd
Sex of facilitator				
Male	4.90	1st	4.93	1st
Female	4.53	2nd	4.74	2nd

Table IV. Constraints encountered by male and female farmers during training programmes (Limitaciones encontradas por los agricultores masculinos y femeninos durante los programas de capacitación).

Constraints	Male		Female	
	Majority of farmers	Decision	Majority of farmers	Decision
Time of training	✓	Minor	✓	Major
Duration of training	✓	Minor	✓	Major
Inadequate information about training	✓	Major	✓	Major
Lack of follow-up after training programmes	✓	Major	✓	Major
Incompatibility of training schedules with household roles	✓	Minor	✓	Major
Finance	✓	Major	✓	Major
Decision of spouse	✓	Not a constraint	✓	Major
Location/distance	✓	Minor	✓	Minor
Lack of support on learning outcome	✓	Major	✓	Major
Previous training experience	✓	Major	✓	Major
Choices of days in the week for training	✓	Minor	✓	Major
Transportation	✓	Minor	✓	Minor
Sex of facilitator	✓	Not a constraint	✓	Not a constraint
Training methods used	✓	Not a constraint	✓	Not a constraint
Mode of training	✓	Not a constraint	✓	Not a constraint
Relevance of training content	✓	Not a constraint	✓	Not a constraint
Language used for training	✓	Not a constraint	✓	Not a constraint
Lack of definite learning outcome	✓	Minor	✓	Minor
Varying levels of knowledge of the trainees	✓	Minor	✓	Major
Lack of gender consideration	✓	Not a constraint	✓	Major
Competence of the trainer	✓	Not a constraint	✓	Not a constraint
Non-use of effective trainin`g tools for demonstration/teaching	✓	Not a constraint	✓	Not a constraint

The results of ANOVA shown in **Table VI** revealed significant difference ($p < 0.05$) between male and female pig farmers' preference for training logistics in the use of cassava plant meal in the diets of growing pigs. The significant difference which existed between male and female farmers in training logistics is detailed in **Table IV**.

DISCUSSION

The proximate composition of common feed resources (cassava peel, plantain peel and palm kernel meal) used by pig farmers revealed variable crude protein and high fibre contents. The high crude fibre of the common feed resources above the maximum tolerable limit for growing pigs could limit the digestibility of nutrients, hinder nutrient efficiency and depress growth (Högberg & Lindberg 2004, p. 127; Len et al. 2009, p. 188). The poor quality of these feed resources had been implicated to negatively impact nutrient supply of pigs, growth, fat deposition and body structure of local farmers' herds (Ocampo, Leterme & Buldgen 2005, p. 324).

Importantly too, the cost analysis revealed that though the cost of cassava plant meal ranked third lowest while the lowest (plantain peels and cassava peels) had deficiency in some essential nutrients in addition to plantain being seasonal and rain depen-

Tabla V. Summary of results of regression analysis (Resumen de resultados del análisis de regresión)

Unstandardized coefficients			Standardized coefficients		
Model	B	Std. Error	Beta	T	Sig.
Constant	2.053	0.646		3.179	0.002
Age	0.024	0.011	0.247	2.117*	0.037
Household size	-0.139	0.069	-0.230	-2.000*	0.049
Farming experience	-0.0615	0.001	-0.378	-3.727**	0.001
Herd size	0.002	0.001	0.162	1.661	0.100
Feeding frequency	0.596	0.219	0.254	2.716**	0.008
Monthly income	-0.0129	0.001	0.212	1.906	0.060

*Significant at $p<0.05$; **Significant at $p<0.01$; ($F = 14.996$, $R^2 = 0.597$)

dent. Thus, the use of cassava plant meal as suitable replacement for maize in the diets of growing pigs owes its advantage to the comparable nutrient (rich carbohydrate, crude protein and fibre) contents, availability throughout the year, reduced competition with human and industrial needs as well as the relatively low cost per kilogram of diet. The incorporation of these under-utilised farm residues (cassava leaves and tender cassava stem) limit the competition between human and pigs for cassava flour and maize especially at off-season period which is characterized by scarcity and high cost. The need for adequate knowledge and usage of cassava plant meal among rural pig farmers is suggestive of the need to train both gender to utilise these advantages.

Also, the engagement of more male than female in pig farming enterprise is a departure from the traditional pig production system dominated by female not only in Nigeria but also true of the traditional pig production system in Lao Democratic People Republic as reported by Phengsavanh et al. (2010, p. 16). As livestock keeping becomes less domestic and gaining more recognition as an important source of family income, its ownership, management and control are turned over to the men (Assan 2014, p. 127). This widespread transition in livestock keeping from an agricultural standpoint to industrial economies was similarly reported by Bravo-Baumann (2000, p. 133). The gap between male and female engagement in pig farming will necessitate appropriate training logistics that would not only enhance more female farmers' participation but also continue to sustain the males in pig production.

Further analysis of the results revealed that the average household size was 3.60 with majority of both male and female respondents having household size of less than five, which may be due to high youth population of respondents. Rural communities are noted for large households which are often used to complement the cost of hired labour (Ekong 2010, p. 176; Faborode 2011, p. 186). The shortfall in family labour is capable of negatively influencing women participation in training

Tabla VI. Results of ANOVA showing significant difference between male and female pig farmers' preference for training logistics (n = 300) (Resultados de ANOVA que muestran una diferencia significativa entre la preferencia de los agricultores porcinos y hembras por la logística de capacitación (n = 300))**.**

	Sum of squares	Df	Mean square	F	p-value
Between groups	26.142	1	26.142	12.684	0.007
Within groups	513.011	298	2.068		
Total	539.153	299			

Source: Field survey, 2018.

based on the fact that availability of family labour gives free time to women farmers to participate in activities outside their homes. When participating in training programmes, other household members provide assistance in household chores.

In addition, each pig farmer made only an average monthly income of ₦9,603.1±104.3 (about 27 USD) from pig farming enterprise; which could be considered very low based on the numerous potentials of pig production which include available ready market, cheap source of family nutrition, its highly prolific nature and fast maturing. This informed the need to train pig farmers in the use of cheaper, less competitive and available feed resources that could enhance growth performance, reduce production cost and improve the income of pig farmers.

Also of importance is that majority of male and female farmers were characterized by youthful workforce and possession of formal education which is critical to delivering desired outcome in any training programme. The youth for example are known for being adventurous, taking risk and more likely to adopt innovations (Jibowo 2000, p. 34) while formal education provides trainees with the opportunity to access prin-

ted materials and information technology in addition to the general training materials.

Further analysis revealed that greater proportions of both male and female pig farmers raised pig mainly for commercial purpose with an average herd size of about 10, while consumption and gift purposes were less prioritised. This implied that the pig farmers were mainly small holders in need of best practices in pig production. This result corroborates the reports of FAO (2012, p. 5), Njuki and Miller (2012, p 1) that rural livestock farming in Africa is dominated by small-scale production. Importantly too, majority of male and female farmers fed their animals twice daily, solely with the common alternative feed resources, while only a few respondents fed them with conventional feeds. This may be due to the exorbitant price or scarcity of the conventional feedstuffs. Similar studies in North Eastern India, revealed that farmers used locally available feed resources (Kumaresan et al. 2007, p. 396) for birds, some of which were characterized with poor nutritive value and under-feeding.

In addition, majority of the female respondents identified market place, family members and religious groups respectively as sources of agricultural information while most male respondents identified friends/ fellow farmers and radio. In all, the females used more sources of information than their male counterpart. This implies that the females were more likely to have more information on resources used for alternative feeding ingredients; a situation which is affirmed by the high levels of awareness of the females than males in this study. Evidently, information from extension agents was least in ranking by the females and also second to the least by the male farmers despite its expected role as the link between the stakeholders (Researchers, Extension, Farmers and Input providers) in the research system. This is an indication of weak linkage which was reported in the earlier studies on linkages among stakeholders in agriculture (Faborode & Ajayi 2015, p. 82; Sewnet, Elemo & Darsos 2016, p. 119). This implies that the identified sources of information widely used by farmers are capable of enhancing male and female participation in training programmes if explored. This represents a major disparity between agricultural policy and practice; not only in Nigeria, but also in other developing countries. In many communities in the sub-Saharan Africa, religion is inseparable from all aspect of the society and daily life of the inhabitants (Haleman & Kaiser 2002, p. 691) and the closeness of the missionaries to the rural poor make them reliable partners in development (Ogbonnaya 2011, p. 69). Networking through religious groups has become a veritable instrument for women empowerment activities in rural communities of Nigeria (Faborode & Alao 2016, p. 153).

Also of importance is the high level of awareness by both gender in the use of alternative feed resources in pig diets, though the females level of awareness was higher with a grand mean score of 4.25 (out of the expected maximum score of 5.0) compared to the score of 4.12 for the male farmers. This slight difference could be partly attributed to women being the sole livestock keepers in traditional society (FAO 2012, p. 5). Similar finding was reported in an early study by Rangnekar (2002) that the female rather than their male counterpart had better knowledge in the use of local feed

resources as diets of livestock. This implies that the use of local feed resources in livestock feeds was not new to the farmers and building training programme on the existing experiences and knowledge of both gender are more likely to make it more appealing to farmers to invest their time and other resources in training.

The analysis of farmers' preference for training logistics revealed many differences and similarities between male and female farmers. The training venues most preferred in order of ranking by the females were the village centres, religious centres and the local government headquarters, while most male preferred farms and homes. A striking difference in the choices of both gender was the preference for public and private places for training by the females and males respectively. This implies that the choice of training venues should be considered as a cultural and gender issue. The male by tradition in sub-Saharan Africa, Nigeria inclusive, do not need the permission of their wives to engage in any activity, private or public while the female do not only require their husbands' approval to attend, there must also be an assurance that such activity would take place in a public place. These are community prescribed social behaviours for all females, married, widowed or single. For training duration, the most preferred choices by majority of female and male farmers were hours and days respectively. Differences also existed in the choices of both gender for the days of the week and time of the day most preferred for training programmes. The female preferred Sunday and evening while Saturday and afternoon were the male choices.

Again, training duration and timing for training programmes are closely related to gender and culturally prescribed roles in rural communities. The female being the household caretaker as well as co-need providers often had to cope with role conflict with lesser time for outside engagements such as training, while the male traditionally have more time after leaving the office or farm work. This finding is in line with the previous work of Njuki and Miller (2012, p. 4) that the women's productive activities are tedious and required a lot of time, energy and consume their productive working time.

Monday to Saturday is normal working days for both male and female in rural households but Saturday is a day when the women and children are expected to perform the general house cleaning, cloth washing and other household chores which often exclude the men. Sundays are free days irrespective of gender, religion and profession. The following excerpts from the key informant interview support the findings:

Sunday is a free day for everyone in the family and the only good day for training without interfering with the household roles of women (A woman in Ajape, Modakeke community)

Saturday afternoon, when all men must have finished working for the week is best for training but I doubt if it will be convenient for the women because of their responsibilities to their husbands and children (A man in Ayepe, Iwaro-Oka Akoko community)

These responses imply the acceptance by both male and female that Monday to Saturday were not appropriate for joint participation in training programmes. Hence, religious centres are gaining prominence for training and empowerment activities for women.

However, there were some similarities between male and female in the choices of practical demonstration for training methods, group for mode of training, Yoruba language for training and after office/farm work hours for period of training. The high preference for demonstration method and group training may be largely due to the expectations of enhancing their understanding, overall benefits and the reinforcing positive effects of group learning on trainees as earlier reported by Alabi and Ajayi (2009, p. 13).

Notably, all female and almost all male farmers preferred the use of Yoruba language which is the common language of communication in the study area and the preference for after office/farm work hours may imply that pigs were reared as secondary enterprise. Despite the similarities, there were some differences in the preferred training methods while most female farmers preferred practical demonstration and the use of printed materials due to gender based constraints, most male preferred only the demonstration method. Similarly, majority of male farmers preferred three (group, one-on-one and selective) mode of training while most female excluded the one-on-one option which was culturally unacceptable.

In addition, the choice of end of farming season preferred by most male farmers was not a choice for most female due to a reason captured in the excerpt from a female key informant in Oke-Agbe community:

Farm work has no end or season for we women, the work are only shifted from the farm to our homes after harvesting and end of rain to preserve, store, process and market farm produce for the family until the next land preparation time.

The differences and similarities in the preferences of male and female farmers imply that the decisions on where, when and how trainings are organised in rural communities were greatly influenced by cultural diversity in gender relations and should be considered in the logistics of training design if equal gender participation is to be achieved in training programmes. By providing women with equal access to resources as men, it was reported that productivity in agriculture would increase by 30.0 percent, output by up to 4.0 percent and the reduction in the number of poor people by up to 17.0 percent (FAO 2012, p. 8).

Furthermore, the pig farmers were constrained by several challenges which vary by gender and in severity. Majority of the females identified most (12 out of 22 listed) constraints as major with only seven and three listed as not a constraints and minor respectively while majority of the male respondents identified only five, eight and nine as major, minor and not a constraints respectively. This implies that the farmers' constraints were gender related with the females more disadvantaged.

CONCLUSION

Based on the findings of the study, there were major on-going transformation in pig farming which includes male dominance, commercialization and development of innovations in appropriate use of alternative feed options for pigs with nutritional and cost advantages. Majority of the farmers had high awareness about the use of alternative resources traditionally used in the diets of pigs, had formal education and were in their active ages but weak linkage existed between the farmers and the government extension agents mandated to link them with researchers. This is a common challenge in many countries in sub-Saharan Africa and North-America following the expiration of the World Bank funding of the extension system.

Consequently, there was knowledge gap with farmers relying solely on traditional alternative resources in pig diets with nutritional deficiencies and earned low income from pig enterprise despite its potentials for high return on investment. It was also revealed that the farmers encountered several constraints in training programmes and the females were more affected than their male counterpart particularly on the logistics of where when and how training should be organised. Considerable differences existed between male and female farmers in their preferences for training venue, duration and period as well as the days in the week and time of the day.in the week and time of the day for training. These differences were largely determined by cultural diversity and gender relation in the study area which points to gender gap in access to information.

Therefore, if the weak extension farmer linkage, gender and knowledge gap in access to information on research output are to be abated, adequate attention should be given to gender preference in the logistics of training design to facilitate adjustment to the on-going transformation in pig production. It is therefore recommended that:

Adequate attention needs to be invested in the currently underutilized public extension services to make it more attractive to farmers by removing the disparity between agricultural extension policy and practice within the reality of farmers' environment. This should be done through collaboration between extension and farmers' most used sources of agricultural information to promote the usage of proven research output in order to strengthen extension-farmer linkage.

A review of the training manuals used by the extension agents would reveal its strengths and weaknesses. Solution for bridging identified weaknesses would be proffered while its areas of strength are promoted.

Reconciling male and female differences in the preferences for training logistics and mainstreaming training by gender where necessary are crucial to redu-

cing the existing gender gap in access to information to enhance equal gender participation in pig enterprise.

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