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Performance of livestock components in crop-livestock production systems in Egbeda Local Government Area, Oyo state, Nigeria

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Abstract

There had been crises arising from crop production and livestock husbandry in a given space over the years in Nigeria. The wanton destruction of lives and properties from these incessant clashes called for serious concerns. Many conflict resolutions and strategies (political, economic and social) reported over the years had limited success. An integrated production system approach of conflict resolution between crop farmers and livestock husbandry is hereby proposed. The study was aimed at assessment of age long practice of livestock husbandry as means of livelihood in the crop-livestock production system in Egbeda local government area (LGA). A multi-stage sampling technique was used to elicit information from purposively selected 225 crop-livestock farmer with the Participatory Rural Appraisal method. Parameters measured were bio-data, average livestock holding/household (TLU), available fodder (ha), livelihood activities and rainfall pattern. Qualitative and quantitative data collected through questionnaire were transcribed into the FEAST Excel macro program (www.ilri.org/feast) were analysed with descriptive statistics. The respondents' categories (%) landless, small, medium, and large scale were 5, 30, 40, and 25, respectively. The TLU values were 0.38, 0.20, 0.12, 0.10 and 0.11 for pigs, goats, indigenous poultry, sheep and commercial poultry. The average area of fodder grown/household (ha) were 1.09, 0.46, 0.40, and 0.30 for maize, napier grass, cassava leaf, and Leucaena leucocephala leaf, respectively. The feed ingredients purchased (N) mainly over 12 months were 380, 270, 192, and 900 for maize gluten meal, cassava fresh peels, maize cracked grains and commercial feed, respectively. The contribution of livelihood activities to household income were labour (13%), agriculture/crop production (35%), business (15%), livestock (25%), remittances (10%), and others (2%). The available feed resources for livestock production were concentrates, crop residues and pasture. Availability of green forages and legumes were influenced by rainfall pattern. The study showed that livestock production enterprise can be successfully incorporated into the crop-livestock production system when there is sufficient rainfall for production of good quality and sufficient fodder.

Keywords: Ecological zones, FEAST, feed resources, livelihood, rainfall pattern

Performance des composants de l'élevage dans les systèmes de production agricole et animale dans la zone de gouvernement local d'Egbeda, État d'Oyo, Nigéria

Résumé

Il y avait eu des crises liées à la production agricole et à l'élevage dans un espace donné au fil des ans au Nigeria. La destruction gratuite de vies et de biens à la suite de ces affrontements incessants suscite de sérieuses inquiétudes. De nombreuses résolutions de conflits et stratégies (politiques, économiques et sociales) signalées au fil des ans n'ont eu qu'un succès limité. Une approche intégrée du système de production de la résolution des conflits entre les

agriculteurs et l'élevage est proposée. L'étude visait à évaluer la pratique séculaire de l'élevage comme moyen de subsistance dans le système de production agricole et animale dans la zone de gouvernement local (LGA) d'Egbeda. Une technique d'échantillonnage en plusieurs étapes a été utilisée pour obtenir des informations auprès de 225 agriculteurs-éleveurs sélectionnés à dessein avec la méthode d'évaluation rurale participative. Les paramètres mesurés étaient les données biologiques, le nombre moyen d'animaux d'élevage/ménage (TLU), le fourrage disponible (ha), les activités de subsistance et le régime des précipitations. Les données qualitatives et quantitatives recueillies par questionnaire ont été transcrites dans le programme macro Excel FEAST (www.ilri.org/feast) et ont été analysées avec des statistiques descriptives. Les catégories de répondants (%) sans terre, petite, moyenne et grande échelle étaient respectivement de 5, 30, 40 et 25. Les valeurs d'UTT étaient de 0,38, 0,20, 0,12, 0,10 et 0,11 pour les porcs, les chèvres, les volailles indigènes, les moutons et les volailles commerciales. La superficie moyenne de fourrage cultivée/ménage (ha) était de 1,09, 0,46, 0,40 et 0,30 pour le maïs, l'herbe napier, la feuille de manioc et la feuille de Leucaena leucocephala, respectivement. Les ingrédients alimentaires achetés (₦) principalement sur 12 mois étaient de 380, 270, 192 et 900 pour la farine de gluten de maïs, les pelures fraîches de manioc, les grains de maïs concassés et les aliments commerciaux, respectivement. La contribution des activités de subsistance au revenu des ménages était la main-d'œuvre (13 %), l'agriculture/la production végétale (35 %), les entreprises (15 %), l'élevage (25 %), les envois de fonds (10 %) et autres (2 %). Les ressources alimentaires disponibles pour la production animale étaient les concentrés, les résidus de récolte et les pâturages. La disponibilité des fourrages verts et des légumineuses a été influencée par le régime des pluies. L'étude a montré que l'entreprise de production animale peut être intégrée avec succès dans le système de production agricole et animale lorsqu'il y a suffisamment de précipitations pour la production de fourrage de bonne qualité et en quantité suffisante.

Mots-clés : zones écologiques, FEAST, ressources alimentaires, moyens de subsistance, régime des précipitations

Introduction

Small holder livestock farmers are often regarded as resource-poor especially in the tropics. Many workers had argued for and against on the significant role(s) of livestock husbandry in the sub Saharan Africa. In an integrated system, livestock and crops are produced within a coordinated framework (*Van Keulen and Schiere, 2004;* FAO 2014). The waste products of one component serve as a resource for the other (Sosina, 2017). For example, manure is used to enhance crop production; crop residues and by-products feed the animals, supplementing often inadequate feed supplies, thus contributing to improved animal nutrition and productivity. The cyclical combination is the mixed farming system as Rota and Sparandini (2010). Animals play key and multiple roles in the functioning of the farm, and not only provide livestock products (meat, milk, eggs, wool, and hides) but also for food, feed and fibre (*Van Keulen and Schiere, 2004; Rota and Sperandini, 2010*). Animals can serve as employment source, income from sales of animal products (*Samiredypalle et al., 2014b,* Herrero *et al*. 2010) and contributes to farmers' livelihood (Sosina, 2020). Animals transform plant energy into useful work as animal traction (Mahesh and Mohini, 2013, Babayemi *et al*., 2014, FAO, 2015) used for ploughing, transport and in activities such as milling, logging, road construction, marketing, and water lifting for irrigation (Sere and

Steinfold, 1996; Sosina *et al*., 2019). Animals also provide manure and other types of animal waste (Makinde and Ayoola 2010, Ayeni *et al*., 2012, Sosina, 2017). The overall benefits of Crop-Livestock integration can be summarized (Rota and Speradini 2010) as follows: agronomic, economic, ecological, social (through the reduction of rural urban migration and the creation of new job opportunities in rural areas) and technical (Descheemaeker *et al.,* 2017, Sosina, 2017). Livestock enterprises also provides coping strategies to farmers during vagaries climate change especially in the availability of feed resources in the tropics (Sosina, 2017; Samiredypalle *et al*., 2014a). Furthermore, information on livestock is vital for the decision-making process (Sosina, 2017, Descheemaeker *et al.,* 2017) and intervention programs by relevant donor agencies (Babayemi *et al*., 2014; FAO, 2015; Sosina, 2020) and philanthropist. There is information on the development and use of a dynamic modeling framework integrating climate crop, pasture, and livestock models in Zimbabwe. (Descheemaeker *et al.,* 2017).

The feed is central to livestock productivity as feed shortage is one of the major problems in most of the developing countries to augment livestock production and productivity (FMANR report 2017, Samiredypalle *et al.,* 2014b, IFAD, 2015). The purpose of the Feed Assessment Tool (FEAST) is to offer a systematic and rapid methodology for assessing feed resources at the site level to develop a site-specific strategy for improving feed supply and utilization through technical or organizational interventions (Duncan *et al.,* 2012, Samiredypalle *et al.,* 2014a, Wassena *et al.,* 2013, ILRI, 2015; Sosina *et al.,* 2019).

There is a paucity of information on the performance of livestock in the crop-livestock production systems. Hence, the study tries to investigate the livestock component in the crop-livestock production system in the derived savannah area of Oyo State, Nigeria.

Materials and methods

The Egbeda study area of Oyo State, Nigeria, is ethnically heterogeneous with a high concentration of smallholder crop and livestock farmers. The population is 81,115 out of which 52% are males and 48% are females. The area lies within Longitudes 1°5' W and 1°39' W and Latitudes 7°9' N and 7°36' N, covering an area of 1,782.2 km^2. It has a bimodal rainfall pattern ranging between 1200 and 1500 mm with a major rainy season from April to August, and a minor rainy season from August to November.

A multi stage sampling technique was used to elicit information from 225 respondents, fifteen respondents were randomly selected from the villages. A cell comprises of about 10 to 15 villages while three cells were randomly selected from the study area. Parameters measured were bio-data, average livestock holding/household (tropical livestock unit, TLU), average dominant livestock species/household, fodder crops grown (ha), dominant fodder species planted (ha), available feed resources and seasonality. Qualitative and quantitative data collected through questionnaire were transcribed into Microsoft Excel the FEAST Excel macro program (www.ilri.org/feast) (Duncan 2014). Data analyzed with descriptive statistics.

Results and discussions

The farmers were categorised as landless, small, medium and large scale. The landless were farmers involved in livestock husbandry on the land that is not owned, rented or lease. They are also referred to as absentee farmer or trans-human. The smallholders are farmers with land size less than 5ha while farmers involved in

livestock husbandry on the pieces of land between 5- 10 ha are also referred to as Medium scale farmers. The famers that practice livestock husbandry on land more than 10 ha are referred to as Large or commercial farmers. The respondents' categories (%) landless, small, medium, and large scale were 5, 30, 40, and 25, respectively (as in Table 1). From the study area, smallholder and medium scale farmers' category forms the majority (75%). The result agreed with Sosina (2020) that reported similar finding among farmers in Ibadan/Ibarapa area of Oyo state. However, the result was in contrast to Sinkaye and Ajayi (2012), Wassena *et al.* (2013) that reported the dominance of smallholder farmers' involvement in livestock husbandry in Sub Saharan Africa. The result also agreed with Herrero *et al.* (2010), Ezeaku *et al.* (2015), IFAD (2015) and Duku *et al.* (2010) that reported the benefits of crop-livestock production systems.

Table 1: Households information summary in Egbeda

Range of land size (ha)	Category of farmer	Total (%)
0	Landless	5
Up to 5	Small farmer	30
5 to 10	Medium farmer	40
More than 10	Large farmer	25
Grand Total		**100**

Table 2: Average livestock holding/Household (TLU) in Egbeda

	Average holding (TLU) per House Hold
Pigs	0.38
Goats	0.20
Poultry - village conditions	0.12
Sheep	0.10
Poultry - Commercial production	0.11

The average livestock holding per household (TLU) expressed the number of livestock each household rears at a given period in order to meet certain household's obligations. The dominant livestock species holding per household (TLU) referred to the species of livestock prevalent among farmers in the study area. The dominant livestock species in the study area were Pigs, goats, indigenous poultry, sheep and commercial poultry. The average holding/household (TLU) values were 0.38, 0.20, 0.12, 0.10 and 0.11 for Pigs, goats, indigenous poultry, sheep and commercial poultry (Table 2). The majority of the farmers kept Pig, closely followed with Goats and indigenous poultry birds. The result agreed with the submission of Ezeaku *et al.* (2015), Fakoya (2007) that reported similar results in Enugu and Abeokuta LGA, respectively. Commercial poultry production is not popular among farmers in the area. This was in contrast to the findings of Sosina (2017) and Chah *et al.* (2014) that reported dominance of poultry production among farmers in the South West of Nigeria.

The average area of fodder grown /household (ha) referred to the sum of area (ha) available to feed the ruminant livestock. The fodder is the feed resources available for ruminant livestock husbandry and are deliberately grown by the farmers in the study area. These available fodder were maize (*Zea mays*), Napier grass (*Pennisetum purpureum*), Cassava (*Manihot esculenta*) leaf and tubers, Leucaena (*Leucaena leucocephala*) and naturally occurring pastures. The sum of the area (ha) available for fodder were 1.09, 0.45, 0.4, and 0.3 for maize, napier grass, cassava (leaf, peels and tubers) and

leucaena, respectively (as in Table 3). The most dominant fodder in the study area was Maize crop compared with other dominant fodder (as in Table .4). In the crop-livestock production systems, farmers often allow ruminants to feed on maize plantation after crop harvest as a measure of integration. The result agreed with the submission of Herrero *et al.* (2010), Sere and Steinfold (1996), Duru *et al.* (2015), Sosina *et al.* (2019) and Sosina (2020). These workers high-lighted the numerous benefits and symbiotic relationship in crop-livestock integration. Moreover, some maize farmers also engaged in the integration due to crop failure experienced during climatic change to mitigate economic losses (Ezeaku *et al.,* 2015, IFAD 2015, Sosina and Adeoso, 2020). Most dairy farmers rely on maize crop residues as important feed resource in the dry season for production of milk at reduced cost (Sosina 2020a). Although, some other ruminant farmers deliberately establish cassava plantation as fodder for livestock (Sosina 2017, Islam *et al.,* 2014, Guyo and Tamir, 2014), silage production (Familade *et al.,* 2011; **Ayele *et al*., 2012, Ayeni *et al*., 2012**), and other feed resources (Samiredypalle *et al.,* 2014b, Duru *et al.,* 2015 Mahesh and Mohini, 2013, Shiawoya and Tsado, 2011, Wassena *et al.,* 2013).

Table 3: Average area of fodder grown per household (ha)

Fodder	Sum of Area (ha)
Maize (*Zea mays*)	1.09
Napier grass (*Pennisetum purpureum*)	0.46
Cassava (*Manihot esculenta*) leaf, peels and tuber	0.40
Leucaena (*Leucaena leucocephala*)	0.30
Grand Total	2.25

Table 4: Dominant fodder crops grown in the area

Dominant fodder crops grown	Sum of Area (ha)
Maize (*Zea mays*)	1.39
Cassava (*Manihot esculenta*)	0.50
Napier grass (*Pennisetum purpureum*)	0.56
Leucaena (*Leucaena leucocephala*)	0.40
Grand Total	**2.85**

Table 5: Quantity of feed (kg) purchased over a 12mth period

Feeds purchased	Total
Maize (*Zea mays*) - gluten meal	380.00
Cassava (*Manihotesculenta*) - fresh peelings	270.00
Maize (*Zea mays*) - cracked grains	192.00
Commercially mixed ration	900.00
Grand Total	**1,742.00**

The quantity of feed resources (Kg) purchased by respondents in the last 12 months were 380, 270, 192, and 900 for maize gluten meal, cassava fresh peels, maize cracked grains and commercial feed, respectively (as in Table 5). The cost of feed resources for ruminants were very low compared with other classes of livestock. The result agreed with the submission of Fakoya (2007), Sosina (2017) and Duku *et al.* (2010) that gave similar findings among ruminant farmers in the derived savannah ecological area. However, the result was in contrast with Sosina (2020) that reported substantial cost of feed resources for good quality and quantity for viable dairy farming compared with other ruminant production system. Also FMANR (2017) reported high quantity of feed required for optimal poultry production across the country due to its quick return on investment compared with other livestock husbandry.

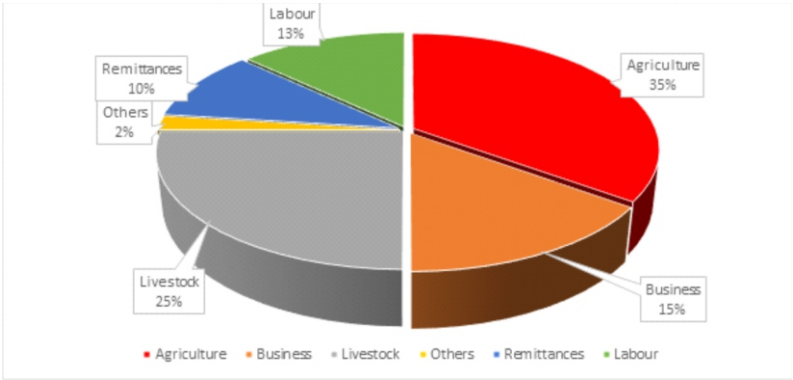

Fig.1: Contribution of livelihood activities to household income (as a percentage)

***Contribution of livelihood activities to household income (%)*:** The various activities that contribute to the farmers' household income are agriculture (crop production), livestock, business, remittances, labour or services and others (Fig.1). The contribution of livelihood activities to household income were labour (13%), Agriculture/crop production (35%), Business (15%), Livestock (25%), Remittances (10%), and Others (2%). The result agreed with Amole and Ayantunde (2016) and Sosina (2020a) that reported similar contribution to farmers' livelihood in Niger Republic and Ibadan/Ibarapa area, Oyo state. Sinkaye and Ajayi (2012) also reported the various livelihood activities as it influences the living standard of farmers in the various ecological zones in Nigeria. However, the result was contrary to Sosina (2017); Ayeni *et al* (2012); Ezeaku *et al* (2015) that reported higher contribution of crop production activity to farmers' household income especially in the rain forest and derived savannah ecological areas.

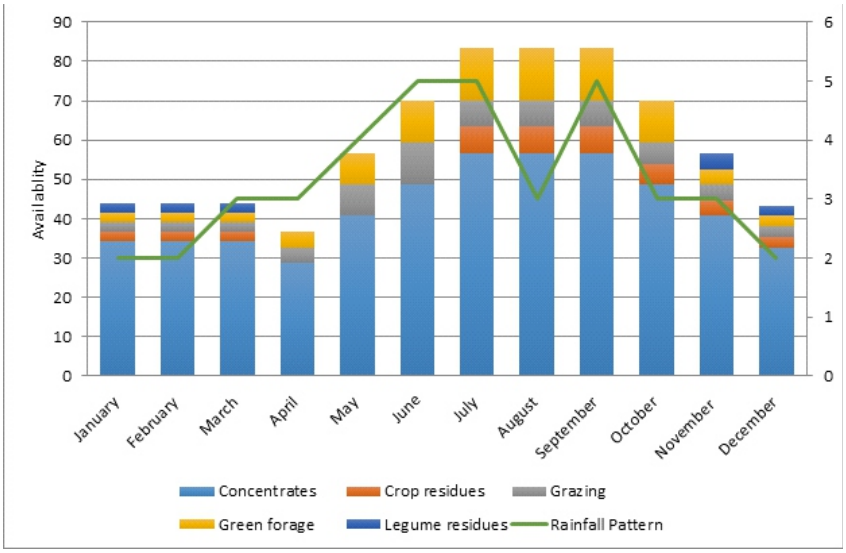

Fig.2: Available Feed Resources in Egbeda LGA

The available feed resources for livestock production were concentrates, crop residues, grazing, green forages and legumes. These feed resources were influenced by rainfall pattern in the study area (Fig.2). The concentrates and legumes were more in abundance compared with other feed resources in Egbeda LGA. Although the availability of feed resources could also be traceable to other intrinsic factors other than rainfall (Wassena *et al.,* 2013; Samiredypalle *et al.,* 2014a; Moraine *et al.,* 2016a). In Egbeda LGA, the availability and abundance of concentrates could be due to the presence of agro industrial companies in the area. Consequently, the increased population of viable livestock enterprises in the area which agreed with the findings of Moraine *et al.* (2016b) and Sosina (2017) in rainforest ecological zone.

Conclusion

The study showed that there is enormous potential for livestock production enterprise in the crop-livestock production system with favourable climate for good quality and quantity of fodder. Also, the rain forest ecological zone of Egbeda local government area favoured **abundance of feed resources for optimal and viable livestock production as well as livelihood support** through livestock husbandry.

Conflict of interest

There is no conflict of interest

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