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Skills and Competencies Required by Graduates of Agricultural Education from Colleges of Education for Entry-Level Cadre in the Livestock Sector in Northeast Nigeria.

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ABSTRACT

This research identified the skills and competencies necessary for graduates of Agricultural Education (GAE) from Colleges of Education for entry-level Job cadres within the livestock sector in Northeast Nigeria. Three research questions guided the study, and two null hypotheses were formulated and tested at a 0.05 level of significance. A descriptive survey research design was employed for the study. The study was conducted in Northeastern Nigeria, covering six states that comprise the Northeast region. The total population for the study was 524 respondents, consisting of 322 livestock farmers and 202 Agric Extension Agents (AEAs). The sample size for the study was 226. The study employed a stratified random sampling technique. Data was collected using a 48-item structured questionnaire entitled Skills and Competency Identification Questionnaire (SACIQ), which was validated by three experts—two from the Department of Livestock Production and one from the Department of Agricultural Education at the Federal University of Agriculture, Makurdi. The internal consistency of the instrument was determined through the Cronbach's alpha reliability test, which yielded a reliability coefficient of 0.89. Data collected was analyzed using Need Gap Analysis (NGA). Findings from the study revealed that GAE from Colleges of Education in Northeast Nigeria are grossly lacking in skills and competencies for entry-level job cadre in the livestock sub-sector. It was recommended that Agricultural Extension Agents, in collaboration with the State ministries of Agriculture, should organize regular workshops for GAE to equip them with skills and competencies in all the skill and competency items identified for the entry-level cadre in livestock production.

Keywords: Skills, Competencies, Agricultural Education, Entry-Level, Livestock

I. INTRODUCTION

The creation of the Federal Ministry of Livestock Development (FMLD) by President Bola Ahmed Tinubu in July 2024 and the recent (April 2025) approval of 90BUSSD by the National Economic Council (NEC) for the Livestock Growth Acceleration Strategy is a step in the right direction towards resuscitating the long-abandoned livestock industry in Nigeria. The sector plays a crucial role in the nation's agricultural landscape and economic framework. Livestock involves raising a variety of animals, such as cattle, sheep, goats, pigs, and poultry.

The livestock sector faces significant challenges like insufficient infrastructure, livestock diseases, the effects of climate change, and disputes over land and resource use, particularly between pastoralists and farmers. This challenge is further exacerbated and compounded by today's level of technological complexity, which characterizes modern livestock husbandry activities. These challenges require livestock workers to be prepared and equipped to work with other stakeholders with the most current best management practices and unbiased information for sustainable livestock production (Fajemisin, 2023).

According to the findings of Barrick, (2011), the entry-level cadre of livestock workers frequently experience feelings of being overwhelmed by the vast array of job requirements. Consequently, supporting these individuals in the early stages of their careers by identifying job-related skills is crucial for achieving success. The authors argue that effective initial training can have a significant impact on employees' behaviors, attitudes, practices, and relationships, resulting in a more productive and less stressful start to their careers.

To say that the Nigerian livestock industry is a major contributor to Nigeria's GDP and supports the livelihoods of millions, especially in rural areas, is to say the obvious. With the burgeoning demand for livestock products, including meat, milk, and eggs, driven by rapid population growth and urbanization, there is a notable opportunity for the sectors' expansion (National Bureau of Statistics (NBS), 2022)

In the context of the heightened food insecurity affecting the nation, the livestock industry is indispensable for ensuring food security, creating employment, and strengthening Nigeria's economic resilience. However, achieving these lofty goals requires professionally skillful and competent livestock managers, especially at the entry-level cadre. The workers require various technical skills and competencies to care for and manage livestock effectively. Some of the skills and competencies needed by entry-level livestock workers, as noted by the Food and Agricultural Organization (FAO,

2022), include but are not limited to Animal Care and Handling, Breeding Techniques, Health Management, Nutrition Management, Husbandry Practices, Record-Keeping, Farm Equipment Operation, Biosecurity Measures, Animal Behavior, Sustainability Practices, etc. These skills and competencies must, therefore, be identified and packaged into a training manual for the entry-level cadre of livestock workers, the aim for which this research is undertaken (Longshal, 2024)

Purpose of the Study

The purpose of the study was to identify the skills and competencies required by agricultural education graduates from colleges of education for an entry-level cadre in the livestock sector in Northeast Nigeria. Specifically, the study sought to:

i. Identify the skills and competencies in Animal health management, animal Care and handling required by Graduates of Agricultural Education in Colleges of Education in Northeast Nigeria for an entry-level cadre in the livestock sector

ii. Identify the skills and competencies in animal breeding techniques and record keeping required by graduates of Agricultural Education from Colleges in Northeast Nigeria for an entry-level cadre in the livestock sector.

iii. Identify the skills and competencies in Animal nutrition and animal farm equipment operation required by Graduates of Agricultural Education in Colleges of Education in Northeast Nigeria for an entry-level cadre in the livestock sector.

Research Questions

i. What are the skills and competencies in Animal health management, animal Care, and handling required by Graduates of Agricultural Education in Colleges of Education in Northeast Nigeria for an entry-level cadre in the livestock sector?

ii. What are the skills and competencies in Animal Breeding Techniques and record keeping required by Graduates of Agricultural Education in Colleges of Education in Northeast Nigeria for an entry-level cadre in the livestock sector?

iii. What are the skills and competencies in Animal nutrition and animal farm equipment operation required by Graduates of Agricultural Education in Colleges of Education in Northeast Nigeria for an entry-level cadre in the livestock sector?

Hypotheses

Three null hypotheses were formulated and tested at 0.05 level of significance.

HO_1: There is no significant difference in the mean rating of the responses of Livestock farmers and Agric. Extension Agents on Animal health management, animal Care, and handling required by GAE for entry-level cadre in livestock production

HO_2: There is no significant difference in the mean rating of the responses of Livestock farmers and Agric. Extension Agents on animal Breeding Techniques and record keeping required by GAE for entry-level cadre in livestock production

HO_3: There is no significant difference in the mean rating of the responses of Livestock farmers and Agric. Extension Agents on Animal nutrition and animal farm equipment operation required by GAE for entry-level cadre in livestock production

II. METHODOLOGY

The design for the study is a descriptive survey research design. A descriptive survey, according to Emmaikwu (2015) aims at collecting data and systematically describing the characteristics, features, or facts about a given population. The main objectives of a descriptive survey are to identify the present condition and point to the present needs, to study the immediate status of a phenomenon, and to conduct fact-finding. A descriptive survey research design is suitable for this study because data will be collected from a sampled population considered representative of the entire group.

The study was carried out in the Northeast States of Adamawa, Bauchi, Borno, Gombe, Taraba, and Yobe. Northeast was chosen because of the high population of individuals involved in livestock production with conducive climatic conditions, which favour livestock production.

The population for the study was 524, made up of 322 livestock farmers and 202 Agricultural Extension Agents from the six Northeast States.

The sample for the study was 226, made up of 146 livestock farmers and 80 Agricultural Extension Agents drawn from the six states using a stratified random sampling technique.

The instrument for data collection was a 54-item structured questionnaire titled Skills and Competencies Identification Questionnaire (SACIQ) with a four-point response option of Highly Required (HR), Averagely Required (AR), Slightly Required (SR), and Not Required (NR) with corresponding values of 4, 3, 2 and 1 respectively.

The instrument was face validated by three experts, one from the Department of Animal Production and two from the Department of Agricultural Education, Federal University of Agriculture, Makurdi, Benue State.

The instrument was trial-tested on 30 respondents from the Federal Capital Territory (FCT), Abuja, to determine the internal consistency of the questionnaire items.

Two hundred and thirty (230) copies of the questionnaire were distributed and retrieved with the help of 12 research assistants, two each from the six States of the Northeast.

Mean and Standard deviation were used to answer the research questions. The limit of numbers was used to determine the skills and competency items that are required as follows: 3.50-4.00=Highly Required, 2.50-3.49=Averagely Required, 1.50-2.49=slightly required, and 1.00-1.49= Not Required. Therefore, any item whose mean value was 2.50 or above was regarded as required, while any item whose mean value was below 2.50 was regarded as not required. Similarly, any item with a Standard Deviation (SD) of 1.9 or below indicates that the respondents are close to the mean and to one another and, therefore, valid. Any item with a Standard Deviation (SD) above 1.96 means that the respondents are not close to the mean and one another, and, therefore, are not valid

III. RESULTS

Table 1

Mean ratings and standard deviation of respondents on skills and competencies required by Graduates of agricultural education from colleges of education in Animal health management, animal Care, and handling for entry-level cadre in the livestock sector in the northeast (N=226: n_1 = 146 Livestock farmers; n_2 = 80 Agricultural Extension Agents)

S/N	Skills and competencies in Animal care, handling, and animal health	X_1	SD_1	X_2	SD_2	X_3	SD_3	Remark
1.	Vaccinate animals for disease prevention	2.82	.79	2.81	.77	2.82	.78	Required
2.	Identify symptoms of animal diseases	2.81	.84	2.79	.85	2.80	.84	Required
3.	Recognize common endo and ectoparasites	3.09	.881	3.07	.89	3.08	.88	Required
4.	Identify birds/animals for culling	2.95	.01	2.93	1.02	2.94	1.02	Required
5.	Understand the common mode of disease transmission	2.95	.87	2.96	.88	2.95	.88	Required
6.	Prevent and control livestock diseases	2.96	.58	2.95	.58	2.95	.58	Required
7.	Understand farm animal diseases	3.10	.95	3.08	.96	3.09	.95	Required
8.	Understand the causative organisms of animal diseases	2.65	1.16	2.63	1.16	2.64	1.16	Required
9.	Recognize the effects of parasites on animals	3.55	.82	3.57	.82	3.56	.82	Required
10.	Carry out a deworming exercise for various animals	3.01	.74	3.00	.75	3.01	.74	Required
11.	Maintain appropriate farm hygiene	3.31	.94	3.31	.94	3.31	.94	Required
12.	Understand the classes of farm animals parasites	3.10	.95	3.08	.96	3.09	.95	Required
13.	Apply various control measures against animal diseases	2.65	1.16	2.63	1.16	2.64	1.16	Required
14.	Understanding animal management	2.95	.01	2.93	1.02	2.94	1.02	Required
15.	Use farm protective gear	2.82	.79	2.81	.77	2.82	.78	Required

Key: N=number of respondents, X_1 = mean of Livestock farmers, SD_1= standard deviation of Livestock farmers, X_2 = mean of AEAs, SD2 = standard deviation of AEAs, X2 = grand mean of respondents SD_2= grand standard deviation of respondents.

Data presented in Table 1 revealed that all 15 skill and competency items in Animal health management, animal Care, and handling had a grand mean value ranging from 2.64 to 3.56, indicating that their mean values were above the cut-off point of 2.50. This showed that all the 15 skill and competency items in Animal health management, animal Care, and handling are required by GAE from colleges of education for entry-level cadre in the livestock sector in the Northeast. The table also showed that the grand standard deviation of the items ranged from .58 to 1.16, indicating that the respondents were

not too far from the mean and from the opinion of one another in their responses on the skills required by GAE for entry-level cadre in the livestock sector.

Table 2

Mean Ratings and Standard Deviation of Respondents on Skills and Competencies required by GAE from Colleges of Education in Animal Breeding Techniques and Record Keeping for entry-level cadre in the livestock sector in the Northeast (N=226: n_1 = 146 Livestock farmers; n_2 = 80 Agricultural Extension Agents)

S/N	Skills in animal breeding techniques and record keeping	X_1	SD_1	X_2	SD_2	X_3	SD_3	Remark
1.	Apply various animal improvement methods	3.13	.91	3.14	.92	3.2	.91	Required
2.	Perform progeny analysis	3.03	.65	3.01	.65	3.1	.65	Required
3.	Carry out artificial insemination	2.82	.60	2.85	.63	2.84	.61	Required
4.	Determine and identify pregnant animals	2.86	.69	2.88	.70	2.88	.70	Required
5.	Castrate male animals	2.79	.64	2.83	.64	2.82	.64	Required
6.	Extract semen using artificial vagina	2.81	.64	2.85	.65	2.84	.64	Required
7.	Understand principles for classification of animals	2.80	.68	2.87	.68	2.83	.68	Required
8.	Understand male/female ratio in breeding systems	2.81	.62	2.84	.62	2.83	.62	Required
9.	Differentiate between inbreeding, outbreeding, and line breeding	2.75	.64	2.81	.64	2.79	.64	Required
10.	Identify animals on heat	2.73	.60	2.79	.61	2.76	.60	Required
11.	Understand the animal estrus cycle	2.76	.61	2.85	.63	2.79	.62	Required
12.	Understand the aims of animal improvement	2.72	.58	2.79	.62	2.75	.60	Required
13.	Assess resources adequately on the farm	3.60	.63	3.52	.68	3.56	.65	Required
14.	Keep daily management records	3.41	.68	3.34	.73	3.38	.70	Required
15.	Keep records of heat periods of livestock/gestation	3.20	.75	3.20	.76	3.20	.75	Required
16.	Identify female/male reproductive organs	2.81	.64	2.85	.65	2.84	.64	Required

Key: N=number of respondents, X_1 = mean of Livestock farmers, SD_1= standard deviation of Livestock farmers, X_2 = mean of AEAs, SD2 = standard deviation of AEAs, X2 = grand mean of respondents SD_2= grand standard deviation of respondents.

Data presented in Table 2 above revealed that all 16 skill and competency items in Animal breeding techniques and record keeping had grand mean values ranging from 2.72 to 3.60, indicating that their mean values were above the cut-off point of 2.50. This showed that all 16 skill and competency items were acquired by GAE from colleges of education in Animal breeding techniques and record keeping for entry-level cadre in the livestock sector. The table also showed that the grand standard deviation of the items ranged from .60 to .92, indicating that the respondents were not too far from the mean and the opinion of one another in their responses on the skills required by GAE from colleges of education in Animal breeding techniques and record keeping for entry-level cadres in the livestock sector.

Table 3

Mean Ratings and Standard Deviation of Respondents on Skills and Competencies required by Graduates of Agricultural Education from Colleges of Education in Animal Nutrition and Farm Equipment Operation (N=226: n_1 = 146 Livestock farmers; n_2 = 80 Agricultural Extension Agents)

S/N	Skills in animal breeding techniques and record keeping	X_1	SD_1	X_2	SD_2	X_3	SD_3	Remark
1.	Formulate livestock ration	2.82	.79	2.81	.77	2.82	.78	Required
2.	Apply basic computational skills	2.81	.84	2.79	.85	2.80	.84	Required
3.	Identify pastures and forage crops	3.09	.881	3.07	.89	3.08	.88	Required
4.	Identify the specimen parts in the animal's digestive system	2.95	.01	2.93	1.02	2.94	1.02	Required
5.	Identify ingredients for ration formulation	2.95	.87	2.96	.88	2.95	.88	Required
6.	Understand different farm animals' digestive systems	2.96	.58	2.95	.58	2.95	.58	Required
7.	Understand the basis for the difference between ruminant and non-ruminant livestock	3.10	.95	3.08	.96	3.09	.95	Required
8.	Understand the symptoms of malnutrition	2.65	1.16	2.63	1.16	2.64	1.16	Required
9.	Process animal products e.g. milk and meat	3.55	.82	3.57	.82	3.56	.82	Required
10.	Operate simple machines for animal management	3.01	.74	3.00	.75	3.01	.74	Required
11.	Use and apply basic ICT skills	3.31	.94	3.31	.94	3.31	.94	Required
12.	Understand the danger of malnutrition of animals	3.10	.95	3.08	.96	3.09	.95	Required
13.	Identify feedstuffs with various nutrient components	2.65	1.16	2.63	1.16	2.64	1.16	Required
14.	Understand the importance of rangelands	2.95	.01	2.93	1.02	2.94	1.02	Required
15.	Formulation of balanced ration and Proper feeding of the animals.	2.82	.79	2.81	.77	2.82	.78	Required

Key: N=number of respondents, X_1 = mean of Livestock farmers, SD_1= standard deviation of Livestock farmers, X_2 = mean of AEAs, SD2 = standard deviation or AEAs, X2 = grand mean of respondents SD_2= grand standard deviation of respondents.

Table 3 above revealed that all 15 skill and competency items in Animal nutrition and farm equipment operation had grand mean values ranging from 2.72 to 3.60, indicating that their mean values were above the cut-off point of 2.50. This indicates that all 15 skill and competency items are required by GAE from colleges of education in Animal nutrition and farm equipment operation for entry-level cadres in the livestock sector. The table also showed that the grand standard deviation of the items ranged from .61 to .91, indicating that the respondents were not too far from the mean and the opinion of one another in their responses on the skills required by GAE from colleges of education for entry-level cadres in the livestock sector.

Table 4

t-test Analysis of Mean Rating of Responses of Livestock Farmers and Agric. Extension Agents on Skills and Competencies Required by Graduates of Agricultural Education from Colleges of Education in Animal health management, animal Care, and handling.

Status	N	Mean	Std. Deviation	Error	Df	t-cal	Sig	Alpha Value	Remarks
Livestock farmers	322	3.0177	.33054	.02280	388	.260	.795	.05	NS, NR
Agric. Extension Agents	202	3.0090	.32503	.02422					

Key: N=Number of respondents, STD = Standard deviation, DF = degree of freedom, t-cal = t-calculated, Sig. = P-value; P>0.05, NS= Not significant, NR = Not rejected.

Table 4 shows a p-value of .795, which is greater than the alpha value of .05. This indicates that there was no statistically significant difference between the mean ratings of responses of Livestock farmers and Agric. Extension Agents on skills and competencies required by Graduates of agricultural education from colleges of education in Animal health management, animal Care, and handling.

Therefore, the hypothesis of no significant difference for the two groups of respondents on skills and competencies required by Graduates of agricultural education from colleges of education in Animal health management, animal Care, and handling was accepted.

Table 5

t-test Analysis of Mean Ratings of Responses of Livestock farmers and Agric. Extension Agents on Skills and Competencies Required by Graduates of Agricultural Education from Colleges of Education in Animal Breeding Techniques and Record Keeping

Status	N	Mean	Std. Deviation	Error	Df	t-cal	Sig	Alpha Value	Remarks
Livestock farmer	322	2.9492	.38829	.02679	388	-.550	.583	.05	NS, NR
Agric. Extension Agents	202	2.9707	.38288	.02853					

Key: N = Number of respondents, STD= Standard deviation, DF= degree of freedom, t-cal= t-calculated, Sig. = P-value; P> 0.05, ns= Not significant, NR = Not rejected.

Table 5 revealed a p-value of .583, which is greater than the alpha value of .05. This indicates no statistically significant difference between the mean ratings of responses of Livestock farmers and Agric. Extension Agents on skills and competencies required by Graduates of Agricultural Education from Colleges of Education in Animal Breeding Techniques and Record Keeping. Therefore, the hypothesis of no significant difference between the two groups of respondents regarding the skills and competencies required of graduates of agricultural education for entry-level job cadre in the livestock sector was accepted

Table 6

t-test Analysis of Mean Rating of Responses of Livestock Farmers and Agric. Extension Agents on Skills and Competencies Required by Graduates of Agricultural Education from Colleges of Education in Animal Nutrition and Farm Equipment Operation.

Status	N	Mean	Std. Deviation	Error	Df	t-cal	Sig	Alpha Value	Remarks
Livestock farmers	322	3.0167	.33064	.02280	388	.260	.795	.05	NS, NR
Agric. Extension Agents	202	3.0090	.32503	.02422					

Key: N=Number of respondents, STD = Standard deviation, DF = degree of freedom, t-cal = t-calculated, Sig. = P-value; P>0.05, NS= Not significant, NR = Not rejected.

Table 6 revealed a p-value of .583, which is greater than the alpha value of .05. This indicates that no statistically significant difference between the mean ratings of responses of Livestock farmers and Agric. Extension Agents on skills and competencies required by Graduates of Agricultural Education from Colleges of Education in Animal Nutrition and Farm Equipment Operation. Therefore, the hypothesis of no significant difference between the two groups of respondents regarding the skills and competencies required of graduates of agricultural education for entry-level job cadre in the livestock sector was accepted

IV. DISCUSSION OF FINDINGS

The findings of the study in Table 1 revealed that 15 skills were required in Animal health management, animal Care, and handling. These skills are: Vaccinate animals for disease prevention, Identify symptoms of animal diseases, Recognize common endo and ecto parasites, Identify birds/animals for culling, Understand the common mode of disease transmission, Prevent and control livestock diseases, Understand farm animal diseases, Understand the causative organisms of animal diseases, Recognize the effects of parasites on animals, Carry out a deworming exercise for various animals, Maintain appropriate farm hygiene, Understand the classes of farm animal parasites, Apply various control measures against animal diseases, Understanding animal management, Use farm protective gear. The findings align with those of Longshal (2024) and Abubakar (2024), who in their separate studies identified 48 entrepreneurial skills and competencies in quails and poultry required for entry into the poultry sub-section of the livestock industry.

Findings in Table 2 revealed that 16 skill and competency items were required by GAE from COEs for Animal Breeding Techniques and Record Keeping for entry-level cadre in the livestock sector in Northeast Nigeria. The skill and competency items include apply various animal improvement methods, Perform progeny analysis, Carry out artificial insemination, Determine and identify pregnant animals, Castrate male animals, Extract semen using artificial vagina, Understand principles for the classification of animals, Understand the male/female ratio in breeding systems, Differentiate between inbreeding, outbreeding, and line breeding, Identify animals on heat, Understand the animal estrus cycle, Understand the aims of animal improvement, Assess resources adequately on the farm, Keep daily management records, Keep records of heat periods of livestock/gestation, Identify female/male reproductive organs.

This finding aligns with Wever (2015), who, in his study, found that livestock breeding techniques and record-keeping are indispensable skills and competencies required for successful livestock production

The findings of the study in Table 3 revealed that 15 skill and competency items were required in Animal Nutrition and Farm Equipment Operation. These skills are: formulate livestock ration, apply basic computational skills, identify pastures and forage crops, identify specimen parts in animal digestive system, identify ingredients for ration formulation, understand different farm animal's digestive systems, understand the basis for the difference between ruminant and non-ruminant livestock, understand the symptoms of malnutrition, process animal products e.g. milk and meat, operate simple machines for animal management, use basic ICT skills, understand the danger of malnutrition of animals, identify feed stuffs with various nutrient components, understand the importance of rangelands, proper feeding of animals. These findings are in agreement with those of Wever (2015), who revealed that in livestock production, animal nutrition is the most important aspect of livestock production. His findings also revealed that skills and competency to operate and maintain simple farm machines are highly required for successful livestock farming.

V. CONCLUSION

The benefits of skill and competency acquisition in livestock production are not in doubt. This is because for success to be achieved in a livestock enterprise, some skills and competencies are required by GAE for entry-level cadres in animal production. The findings have revealed that Animal health management, animal Care, handling, Animal Breeding Techniques, record Keeping, Animal Nutrition, and Farm Equipment Operation are highly required in livestock enterprises. Acquisition of these skills and competencies by GAE from COEs for entry-level cadres in livestock production in the Northeast States of Nigeria will ensure food security, create job opportunities, reduce poverty, and bring about sustainable economic development of the Northeast.

VI. RECOMMENDATIONS

Based on the findings of the study, the following recommendations are made.

1. Agricultural Extension Agent, in collaboration with the State ministries of Agriculture, should organize regular workshops for GAE to equip them with skills and competencies in all the skill and competency items identified for entry-level cadre in livestock production.

2. The identified skill and competency items should be built into the National Minimum Standard by NCCE as part of the curriculum of Agricultural Education.

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