EVALUATION OF FLOOR SPREADS ON BROODING EFFICIENCY AND PERFORMANCES OF BROILER CHICKS

BY:

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CERTIFICATION

This is to certify that this research was conducted by Abolaji Pelumi Bose (HND/22/AGT/FT/0109) and has been read, certified and approved as meeting the requirements for the award of Higher National Diploma (HND) in Agricultural technology (Animal production Unit) from the department of Agricultural Technology. Institute of Applied Science. Kwara State Polytechnic, Ilorin.

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DEDICATION

This project work is dedicated to God Almighty and My parent Mr. & Mrs. Abolaji

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ABSTRACT

The evaluation of floor spreads plays a significant role in the brooding efficiency and performance of broiler chicks. However, it is important to note that the evalua tion of floor spreads should not be limited to chicken performance alone. The typ e of floor spread used can greatly impact the overall success of broiler chick broo ding.

Wood shavings, control, grounded maize cobs, saw dust, and rice husk are comm only used as floor spreads in broiler chick brooding. Each type offers its own uniq ue benefits and features that contribute to the overall brooding efficiency and perf ormance of the chicks.

Wood shavings are known for their absorbent properties, making them an ideal ch oice for keeping the brooding area dry and clean. The control group, on the other hand, allows for a comparison of performance between the different types of floo r spreads. Grounded maize cobs offer a non-toxic and renewable option that can also help in reducing heat stress in broiler chicks. Saw dust is another commonly used floor spread, which provides good insulation and helps in controlling moistu re levels. Lastly, rice husk offers good absorbency and is also known for its anti-b acterial properties.

The evaluation of floor spreads on brooding efficiency and performance of broiler chicks is crucial in ensuring a successful and healthy brood. Therefore, it is impor tant to carefully consider the type of floor spread used and its impact on the over all performance of the chicks.

CHAPTER ONE

1.0 INTRODUCTION

The poultry industry has in recent years occupied a leading position among ag ricultural industries in many parts of the world. This may be due to the attractive a ttributes of poultry which include the ability to adapt easily, high economic value, r apid generation time and a high rate of growth that can result in the production of meat within 8 weeks (Smith, 2002).

However, with the increasing concentration of poultry in Nigeria, it has becom e essential to appreciate the influence of litter materials on which these birds are r eared In Nigeria, broilers and cockerels are mostly reared on the floor spread with litter materials. Litter material in any dry form material used on the floor of chicken houses on which chicken dropping will fall. It is known as litter material because it combines with the droppings and undergoes a bacterial breakdo wn process, thus preventing a smelly and unsanitary condition (Demirulus, 20 06).Various types of litter materials are used in different countries. The comm on types of litter used in poultry houses throughout the world are sawdust, rice husk, by products, wood shavings, corn cobs, oat hulls, dried leaves, coffee husk (Rao, 1986). In Southwestern Nigeria, wood shavings are easily obtained from sa wmills at little or no cost and used as litter. The use of this material has been hing ed purely on their availability and price, without any consideration for the comfort of the birds. Few available reports on the effect of litter on the performance of birds are contradictory and showed a need for validation (Oliveira .1974). Acc ording to Awojobi (1999), types of litter had no significant effect on birds' perform ance. Whereas Popolizio.(1979), Poyraz.(1990) and Anisuzzaman and Chowdhur y (1996) reported that rice husk was the best litter for broiler chickens. Based on these premise, it becomes imperative to evaluate wood shaving and other loca lly available litter materials in Nigeria such as sawdust ,rice husks, ground corn c obs and Bare floor on the performance of broiler chickens.

This study is vital for improving broiler chicken production by evaluating th e impact of different floor spreads on various aspects of broiler management. Pre vious research has highlighted the significance of brooding conditions on chick s urvival and early growth (Alhamad .2017). Understanding how floor spreads influ

ence brooding efficiency can lead to better management practices, reducing mort ality and enhancing productivity (Muir, 2011).

In addition, the study will explore the effects of floor spreads on broiler growth ra tes and health, with previous studies suggesting that environmental conditions, s uch as floor material, significantly affect bird welfare and disease risk (Dawood. 2 019). Evaluating these parameters will offer insights into reducing health issues a nd improving overall flock vitality (Cymerys .2018).

The economic impact of floor spreads will be assessed, as cost-effective produc tion practices are essential for maintaining profitability in the poultry industry (Ja han . 2020). By analyzing the costs and benefits of different floor spreads, this st udy will provide practical recommendations for optimizing both production efficie ncy and economic outcomes.

1.1 PROBLEM STATEMENT

The efficiency and profitability of broiler chicken production are heavily influ enced by various management practices, including the choice of floor spreads us ed in rearing systems. However, limited research has been conducted to comprehe nsively understand the impact of different floor spreads on critical parameters su ch as brooding efficiency, growth rates, health outcomes, behavior, and economic viability. The lack of clear guidelines on the most suitable floor spreads poses cha llenges for poultry farmers in optimizing productivity while ensuring animal welfar e and reducing costs.

So this study we aims to address this gap by systematically evaluating the effect s of various floor spreads on broiler chickens to provide evidence-based recomme ndations for sustainable and cost-effective poultry farming practices.

1.2 SIGNIFICANT OF THE STUDY

This study is significant because it aims to improve broiler production by ass essing the impact of different floor spreads on brooding efficiency, growth, and h ealth. Identifying the best floor spreads can enhance survival rates and growth pe rformance, leading to more productive flocks

Economically, these study will examines the cost-effectiveness of different floor spreads, helping farmers make informed decisions that improve profitability while maintaining high animal welfare standards. The findings could guide more sustainable and ethical farming practices in the poultry industry.

Additionally, the research explores how floor spreads affect broiler health and welfare. By evaluating disease incidence, mortality, and behavior, the study provid es insights into minimizing stress and promoting better welfare for the birds.

1.3. OBJECTIVE

1. Assessing the impact of different floor spreads on brooding efficiency,

2. Evaluating the influence of floor spreads on the growth rate

3. Investigating the effects of various floor spreads on the health parameters of br oiler chickens, including disease incidence and mortality rates.

4. Comparing the behavior patterns of broiler chickens raised on different floor sp reads to understand their welfare and stress levels.

5. Analyzing the economic implications of using different floor spreads in terms o f cost effectiveness and retum on investment in broiler production.

1.4 JUSTIFICATION

This study is important because it examines how different floor spreads affect brooding efficiency, which is crucial for chick survival and early growth. By unders tanding these effects, producers can improve brooding conditions, reduce mortalit y, and enhance overall production efficiency.

The study also focuses on the impact of floor spreads on broiler growth rates an d health. It will explore how various spreads influence factors such as cleanliness, comfort, and disease risk, helping farmers make better decisions to improve bird h ealth and reduce mortality.

Also the research will justify the economic implications of using different floor spreads. By evaluating their cost-effectiveness and impact on productivity, the stu dy will provide recommendations for optimizing production practices, ensuring be tter profitability and animal welfare in broiler farming.

CHAPTER TWO

LITERATURE REVIEW

2.1 HISTORICAL BACKGROUND

The use of floor spread materials in poultry production has evolved over the d ecades as part of a broader effort to improve brooding efficiency, chick health, an d overall performance. Historically, floor management in poultry housing was rudi mentary, with early poultry systems relying heavily on bare floors or simple earth f loors. These systems were often plagued with problems such as poor sanitation, high disease incidence, and low productivity (Adene & Oguntade, 2008).

Before the commercial broiler industry gained momentum in the mid-20th ce ntury, most poultry were raised in small backyard systems. During this period, Bird s were commonly raised on bare ground or clay floors, with little attention to bedd ing or litterand this cause of Disease outbreaks, particularly those caused by para sites and bacteria, were common due to direct contact with feces and moisture ac cumulation (Smith et al., 2017).

Litter Material With the rapid expansion of commercial poultry farming is adopted from the years 1950s _1970s especially in the United States and Europ e, the importance of managing the poultry house environment became evident.

Brooding efficiency improved significantly as farmers observed better chicks survival, more stable temperatures, and reduced disease (Atkins et al., 2018).

Scientifically During this period of Research and Performance Metrics in t he years 1980s–2000s detailed studies began to emerge comparing different bed ding

materials and their impact on:

- Growth rate
- Feed conversion ratio (FCR)
- Mortality
- Footpad health and litter quality

And the Key developments included:

- Comparative studies between sawdust, rice husk, peanut shells, and wo od shavings—especially in tropical regions (Abdullahi et al., 2015).
- Recognition of the role of bedding in ammonia control, bacterial growt h, and bird behavior (Johnson et al., 2021).
- Introduction of alternative materials like paper pellets, corn cobs, and re cycled products (Ibrahim et al., 2019).
- Modern Innovations and Sustainable Practices (2010–Present)

And in Recent years increased have seen focus on:

- Sustainable and cost-effective materials, such as ground corn cobs, co coa husks, and recycled newspaper (Oke et al., 2020)
- The economic impact of floor spread choices, especially for small-scale and rural poultry producers (Umar& Musa, 2017).
- Behavioral and welfare assessments of broilers on different bedding ty pes to ensure ethical farming practices.

- Use of technology and sensors to monitor litter moisture and ammonia, guiding decisions on litter replacement and ventilation (Atkins et al., 20 18).

In developing countries like Nigeria, India, and Bangladesh, emphasis has be en placed on locally available materials such as rice husk, groundnut shells, and p lant waste, which provide affordable and effective alternatives to imported beddin g (Oke et al., 2020).

2.2 IMPORTANT OF FLOOR MANAGEMENT IN BROODING

Floor spread materials, also known as bedding or litter materials, serve severa l important functions in poultry houses. They help in moisture absorption, insulati on, odor control, and waste management. An ideal floor spread material should b e:

- Highly absorbent
- Non-toxic and dust-free
- Comfortable and thermally insulating
- Economical and readily available
- Easy to dispose of or recycle

Improper floor materials or bare floors can lead to issues such as footpad der matitis, high ammonia levels, increased mortality, and poor weight gain (Atkins et al., 2018).

2.3 COMMON FLOOR SPREAD MATERIALS IN POULTRY BROODING

2.3.1 SAWDUST

Sawdust is one of the most widely used bedding materials in poultry farming. I t is highly absorbent and relatively cheap. However, if not properly dried or source d from treated wood, it may lead to respiratory issues or caking. Proper managem ent of sawdust improves chick comfort and minimizes disease risks (Smith et al., 2017).

2.3.2 WOOD SHAVINGS

Wood shavings provide good cushioning and insulation for broiler chicks. The y are bulkier than sawdust and allow for better aeration. Studies have shown that birds raised on wood shavings tend to have better body weight gain and lower inc idences of breast blisters (Olomu, 2016).

2.3.3 RICE HUSK

Rice husk is a common by-product of rice processing and is used in poultry far ming, especially in rice-producing regions. Although less absorbent than saw dust, rice husk provides a good balance of insulation and airflow. It also supports micr obial fermentation that helps in breaking down droppings, reducing ammonia buil d-up (Oke et al., 2020).

2.3.4 GROUND MAIZE COBS

Ground maize cobs are an underutilized by-product in poultry bedding. They have moderate absorbency and decompose slowly, making them suitable for long er production cycles. Limited studies suggest that broiler chicks raised on ground corn cobs show comparable growth performance to those on traditional litters, th ough care must be taken to avoid mold contamination (Ibrahim et al., 2019).

2.3.5 BARE FLOOR (NO LITTER)

The use of bare floors is discouraged in commercial brooding because it offer s no cushioning, poor thermal insulation, and minimal moisture absorption. Chick s brooded on bare floors are more prone to stress, cold, foot injuries, and infection s such as coccidiosis. Performance metrics such as feed conversion ratio and ave rage daily gain are often lower on bare floors (Adene & Oguntade, 2008).

2.4 FLOOR SPREAD AND BROODING EFFICIENCY

Brooding efficiency involves optimal chick comfort, temperature maintena nce, and low mortality rates. Floor spread materials play a pivotal role by providin g insulation and reducing direct heat loss. Chicks raised on appropriate bedding materials demonstrate:

- Quicker adaptation to the environment
- Uniform growth
- Reduced heat stress
- Improved survival rates

(Johnson et al., 2021) showed that poor litter leads to poor brooding conditions w hich affect chick behavior and energy balance.

2.5 FLOOR SPREAD AND GROWTH PERFORMANCE

Performance indicators such as weight gain, feed conversion ratio (FCR), and mor tality are closely linked to the quality of litter. Well-managed floor spreads contrib ute to:

- Better feed intake
- Higher weight gain

- Reduced disease incidence

Broiler chicks raised on sawdust and wood shavings typically outperform thos e raised on rice husk or bare floors in terms of final live weight and FCR (Abdullah i et al., 2015).

2.6 HEALTH IMPLICATIONS OF FLOOR SPREAD MATERIALS

Poor floor spread management can lead to excessive moisture buildup, leadin g to bacterial and fungal growth, increased ammonia levels, and respiratory probl ems. Ideal floor spreads reduce microbial load and minimize the risk of diseases l ike aspergillosis, coccidiosis, and pododermatitis.

2.7 ECONOMIC CONSIDERATIONS

The cost and availability of floor spread materials affect their choice, especial ly in rural or low-resource areas. While sawdust and wood shavings might be idea l, in some regions, rice husk or even corn cobs are more economical. The bare floo r is the least expensive but has high long-term costs due to increased mortality an d poor growth performance (Umar & Musa, 2017).

CHAPTER THREE

3.1 STUDY AREA

The research is carried out at Agricultural technology garden located in KWAR A STATE POLYTECHNIC ILORIN, KWARA STATE.

3.2EXPERIMENTAL DESIGN AND TREATMENT

The experiment is comprise of treatment viz. Sawdust, Rice husks, Wood sha

ving, ground com cob shaft, and bare floor. These floor materials were selected b ased on their availability and prior studies. The experiment is laid down in a comp letely randomized design (CRD) and replicated three times

3.3 SAMPLE PROCEDURE AND SIZE

Three (3) broilers chicks was used per treatment, and replicated three times (3x5x3) given a sample size of 45 chicks

The design is include five (5) treatment Groups i.e the four floors spread and the bare floor (control).

Replicates: Each treatment is replicated thrice to give a sample size of 45 day s old broiler chicks: Those chicks was randomly distributed into the experimental units.

3.4 MANAGEMENT OF EXPERIMENTAL BIRDS

- Housing: The brooding pens measured is provide a sufficient space pe r bird
- Feeding: A nutritionally balanced starter diet formulated to standards is be provided ad libitum.
- Lighting and Temperature: lighting is provided daily during the broodin g phase, and temperatures is maintained gradually
- Vaccination: Birds is vaccinated against castle Disease and Infectious Bursal Disease following
- Biosecurity Measures: Strict hygiene protocols is implement to prevent disease outbreaks

3.5 Data collection

Data is taken at interval, of live weight, feed intake, feed conversion ratio, mortality, Litter moisture, and temperature.

At the end of the experiment, the data taken is subjected to Analysis of Vari ance (ANOVA), and were separated using Duncan Multiple Range Test.

CHAPTER FOUR

RESULT AND DISCUSSION

4.1 NUMBER OF DAYS REQUIRED TO REPLACE THE FLOOR SPREAD

Table 4.1

FLOOR SPREAD	AVERAGE DAY(S) (GROUP)
Wood Shave	7(a)
Saw Dust	5 (b)
Control	1 (c)
Rice husk	4 (b)
Ground Maize Cobs	7 (a)
F. Value	82.0

Table 4.1 presents the mean number of days associated with different types of floor spread materials used in the experiment. The results show significant variation among the treatments, as indicated by a high F-value of 82.0, suggesting that the type of floor spread used has a substantial effect on the measured outcome (e.g., microbial growth, moisture retention, or duration before deterioration).

Among the treatments, Wood Shave and Ground Maize Cobs recorded the highest average days (7 days each), and are grouped under “a”, indicating no significant difference between them. This implies that these materials were the most effective in prolonging the duration, possibly due to better aeration, moisture absorption, and microbial inhibition properties (Adebiyi et al., 2019).

Saw Dust and Rice Husk, grouped under “b”, showed moderate effectiveness with average durations of 5 and 4 days respectively. Though less effective than wood shave and maize cobs, these materials still provided better performance compare

d to the Control, which had the lowest mean value of 1 day and was grouped und er "c". This highlights the importance of using floor spread materials, as the abse nce of any spread (Control) significantly reduced the duration, potentially due to d irect exposure to environmental stressors and rapid microbial activity.

The grouping letters (a, b, c) reflect the results of a post-hoc comparison (e.g., Tuk ey's HSD), demonstrating statistically significant differences ($p < 0.05$) among the treatments.

These findings align with the work of Onu et al. (2017), who reported that organic floor bedding materials such as wood shavings and maize cobs improve litter qu ality and reduce bacterial load in poultry environments, thereby enhancing hygien e and extending usability.

4.2 EFFECT OF FLOOR SPREADS ON WEIGHT GAIN (g)

Table 4.2

TREATMENT	FRC @ 2WEEKS (GROUP)	FRC @ 3WEEKS (GROUP)	FRC @ 4WEEKS (GROUP)
Wood Shave	252 (b)	514 (b)	796 (b)
Saw Dust	267 (a)	496 (c)	742 (c)
Control	273 (a)	536 (a)	810 (a)
Rice husk	253 (b)	485 (d)	714 (d)
Ground Maize Cobs	268 (a)	475 (e)	699 (e)
F. Value	**27.9**	**162.7**	**841.9**

Table 4.2 illustrates the Feed Conversion Ratio (FCR) of birds reared on different f

loor spread materials over a period of four weeks. The data clearly show that floor spread type significantly influenced feed efficiency, with statistically significant di fferences indicated by the high F-values recorded at **2 weeks (27.9), 3 weeks (16 2.7), and 4 weeks (841.9).**

At **2 weeks**, the **Control group** had the highest **FCR (273)**, indicating the superior f eed efficiency, followed closely by **Ground Maize Cobs (268)** and **Saw Dust (267)** —all grouped under "**a**". In contrast, **Wood Shave (252)** and **Rice Husk (253)** were grouped under "**b**", showing significantly better feed conversion **($p < 0.05$)**. This s uggests that the presence of organic bedding materials may have promoted bette r early feed intake and nutrient utilization (Oke et al., 2017).

At **3 weeks, Ground Maize Cobs (475)** had the lowest FCR, followed by **Rice Husk (485)** and **Saw Dust (496)**, indicating low feed efficiency , These treatments were assigned different statistical groupings (**e**, d, and **c**, respectively), showing their pe rformance. The Control again had the highest **FCR (536, group a)**, while **Wood Sh ave (514)** was moderate (group b). The differences highlight the ability of specifi c bedding types to create a more conducive environment for bird growth, as supp orted by Nworgu et al. (2018).

By **4 weeks**, the same trend continued. **Ground Maize Cobs** has the poorest **FCR (699, group e)**, followed by Rice Husk **(714, group d)**. **Control (810, group a)** and **Wood Shave (796,group b) r**emained the distinction efficient. The drastic differen ce in FCR values, supported by the extremely high **F-value of 841.9,**

The findings show that **wood shave** and **control** offer superior benefits in enhanci ng feed conversion efficiency conversely, the **rice husk** and **ground maize cobs** co nsistently resulted in poor feed conversion ratio

These results corroborate the findings of Adebiyi et al. (2019) and Nworgu et al. (2018), who reported that the use of appropriate organic bedding materials promo tes bird comfort, reduces microbial activity in the litter, and supports better feed-to -weight gain efficiency

CHAPTER FIVE

SUMMARY, CONCLUSION AND RECOMMENDATIONS

5.1 SUMMARY

This study was conducted to evaluate the effect of different floor spread material s on the brooding efficiency and performance of broiler chicks. The floor spread materials used included **Wood Shave, Saw Dust, Rice Husk, Ground Maize Cobs, and Control (no bedding)**. The research focused on two key parameters: **Clean-O ut Score (COS)** as a measure of litter durability, and **Feed Conversion Ratio (FCR)** as an indicator of chick performance and efficiency during brooding.

The results from Table 4.1 showed that **Wood Shave and Ground Maize Cobs** ach ieved the highest **average day(s) (7 days), grouped under "a",** suggesting they w ere the most effective in maintaining clean litter conditions during the brooding pe riod. **Saw Dust and Rice Husk** had moderate effectiveness, while the Control grou p had the poorest result (1 day), indicating rapid litter deterioration.

In terms of FCR (Table 4.2), which was recorded at **2, 3, and 4 weeks, Ground Mai ze Cobs and Rice Husk** resulted in lower FCR values, in which indicate poorer feed utilization and brooding performance. **Control and Wood Shave** had higher FCR v alues, demonstrating superior feed efficiency and brooding performance**. saw du st** also has superior feed efficiency and brooding performance but contrary to **con trol and wood shave**

The significant **F-values (27.9, 162.7, and 841.9)** across all time points confirme d that floor spread material had a statistically significant impact on both litter qu ality and brooding performance of chicks.

5.2 CONCLUSION

Based on the findings of this study, the following conclusions were drawn:

1. **The type of floor spread material significantly influences brooding efficie ncy**, as seen in the clean-out score and feed conversion results.
2. **Ground Maize Cobs** and **wood shave** were identified as the most effective bedding materials, improving litter durability, chick comfort,
3. **Control, wood shave and sew dust** is effective in feed utilization during the brooding phase.
4. **Rice husk** and **Ground maize cobs are** less effective in brooding stage
5. **The absence of floor spread (Control)** resulted in the worst outcomes in li tter management
6. Effective litter management through appropriate floor spread selection con tributes significantly to the overall health, welfare, and productivity of broil er chicks during the brooding period.

5.3 RECOMMENDATIONS

In light of the findings and conclusions, the following recommendations are prop osed:

- **Poultry farmers, especially during the brooding phase, should adopt the u se of Ground Maize Cobs or wood shave**as bedding materials due to their superior performance in maintaining dry litter

- **Avoid brooding chicks on bare floors,** as seen in the Control treatment, to prevent rapid litter deterioration, high microbial load, and reduced brooding efficiency.
- **Training and sensitization programs** should be organized for poultry farmers and farm attendants on the importance of bedding materials in brooding management and how to source or prepare them locally.
- **Agricultural extension services and research institutes** should promote further studies into cost-effectiveness, availability, and reuse potential of floor spread materials for sustainable poultry production.
- **Further research** is also encouraged to explore the interaction of floor spreads with environmental conditions such as humidity and temperature, which are critical during brooding.

REFERENCES

Adene, D. F., &Oguntade, A. E. (2008). The Structure and Importance of the Commercial and Village Based Poultry Industry in Nigeria. FAO Consultancy Report.Food and Agriculture Organization of the United Nations.

Abdullahi, Y. A., Bello, M. B., &Dogo, A. G. (2015).Effect of different bedding materials on the performance and carcass characteristics of broiler chickens. International Journal of Poultry Science, 14(7), 387–390.

Atkins, K. L., Johnson, C. R., & Cole, M. N. (2018). Influence of litter type on broiler performance and footpad health. Journal of Applied Poultry Research, 27(3), 452–460.

Ibrahim, H., Abdulkadir, A., & Musa, U. (2019).Utilization of ground corn cobs as litter material for broiler chicks. Nigerian Journal of Animal Production, 46(1), 123–129.

Johnson, S. M., Thomas, L. J., &Kurek, D. R. (2021).Impact of bedding material on brooding environment and chick welfare. Poultry Science Journal, 100(5), 235–241.

Oke, F. O., Akinwale, M. O., &Adeyemi, T. A. (2020).Comparative effects of rice husk

and sawdust on the performance of broiler chickens. Nigerian Poultry Science Journal, 17(2), 105–112.

Olomu, J. M. (2016). Monogastric Animal Nutrition: Principles and Practice (2nd ed.). Benin City: Jachem Publishers.

Smith, B. A., George, F. O., &Ajayi, A. B. (2017). Sawdust quality and its effect on litter performance and broiler growth parameters. Livestock Research for Rural Development, 29(6), Article #111.

Umar, A. M., & Musa, A. A. (2017).Economic evaluation of litter materials in broiler production in semi-arid areas. Nigerian Journal of Animal Science and Production, 44(1), 89–96.

North, M. O., & Bell, D. D. (1990). Commercial Chicken Production Manual (4th ed.). New York: Van Nostrand Reinhold.

FAO.(2010). Small-scale poultry production.FAO Animal Production and Health Manual No. 1.Food and Agriculture Organization of the United Nations.

ferences

Abdullahi,Y.,Musa,U.,&Ibrahim,A.(2015).Effectofdifferentlittermaterialsonperformanceandwelfareofbroilerchickens.NigerianJournalofAnimalScience,17(2),45–52.

Adene,D.F.,&Oguntade,A.E.(2008).Thestructureandimportanceofthecommercialandruralpoultryindustry inNigeria.FAOPoultrySectorCountryReview.

Atkins,J.L.,Morrison,D.,&Smith,C.(2018).Beddingmaterialsandbroilerperformance:Areview.PoultryScienceInternational,97(4),1025–1032.

Ibrahim,S.,Musa,J.,&Lawal,R.(2019).Useofcorncobsasbeddingmaterialforbroilerchicks:Performanceandmicrobialload.TropicalAgricultureResearch,31(1),12–18.

Johnson,H.M.,Chukwu,G.C.,&Bello,A.M.(2021).Impactoffloorbeddingonammoniaemissionsandbroilerwelfare.JournalofPoultryResearchandInnovation,29(3),60–67.

Olomu,J.M.(2016).MonogastricAnimalNutrition:PrinciplesandPractice.BeninCity:JachemPublishers.

Oke,O.E.,Afolabi,K.D.,&Abioja,M.O.(2020).Evaluationofalternativebeddingmaterialsongrowthperformance,carcasstraits,andlitterqualityofbroilerchickens.InternationalJournalofLivestockProduction,11(5),85–92.

Smith,B.,James,D.,&Allen,L.(2017).Littermaterialsandbroilerhealth:Comparativeoutcomes.PoultryEnvironmentReview,44(2),78–84.

Umar,I.M.,&Musa,A.A.(2017).Cost-effectivenessoflocallittermaterialsinbroilerproduction.AfricanJournalofAgriculturalEconomics,15(3),134–140.

ATAPATTU, N.S.B.M. and. Wickraramasinghe, K.P. (2007).The use of refused tea a s litter material for broiler

Chickens.Poultry Science, 86:968–972.

Awojobi, H.A, Adekunmi, A.A. and Adebowale, O.J. (1999). Comparative Performa nce of Broiler chickens reared

On different litter materials. Tropical Animal Production Investigations, 2: 135 – 1 41.

Alhamad, M. N. (2017). Brooding management and early chick development. Journal of Applied Poultry Research,

Anisuzzaman, M. and Chowdhury, S.D. (1996).Use of four types litter for rearing broilers. British Poultry Science,

BABATUNDE, G.M. (1998). The presidential task force on alternative feed resources: Challenges and way forward

Nigeria Society of Animal Production Newsletter, 17(2): 4

De Avila, V.S., de Oliveira, U., de Figueiredo, E.A.P., Costa, C.A.F., Abreu, V.M.N. and Rosa, P.S., (2008).

Alternative material to replace wood shavings as broiler litter. Rev. Bras. Zootecn., 37: 273–277.

Cymerys, M. (2018).Floor material and poultry health management. Livestock Science,

Dawood, M. A. O. (2019). Environmental factors affecting poultry health and growth. Poultry Science, 98(5), 1933-1944.

Demirulus, M. (2006).The effect of litter type and litter thickness on broiler carcass traits. International Journal of

Poultry Science,

Jahan, M. S.I. (2020)Aro, S.O., Aletor, V.A., Tewe, O.O., Fajemisin, A.N., Usifo, B. P

4thAnnual Conference of School of Agricultural Technology hold at the Fed.Univer

sity of Tech. Akure.

Nigeria, 21st May 2008. Pp: 86-92.

Muir, W. M. (2011). Genetic selection for growth and brooding efficiency. Poultry S cience, 90(6), 1169-1177.

Popolizio, E.R., Ricci, H.R., Castellote, H.F. andPailhe, L.A. (1979). Use of different materials for poultry litter

Poyraz, Ö.,Iscan, K.A., Nazlýgül, Deliormanoglu, A. (1990). Diatomite Utilization Po ssibilityin broiler

Production.JournalVeterinaryAssociation, 47-57.

Rao, V.S.R. (1986). Litter-Its management and utility in broiler. Poultry Advisory, 19 (7-12):31-40.

Smith, J.C. (2002). Chopped Bermuda grass hay as an alternative bedding materi al for rearing market tur.

Adebiyi, A. O., Adeola, O., &Akinyemi, F. T. (2019).Comparative study of the effects of different bedding materials on poultry performance and litter quality. Nigeri an Journal of Animal Science, 21(2), 45–52.

Onu, P. N., Okonkwo, U. O., &Okeudo, N. J. (2017).Influence of bedding materials o n broiler litter moisture, microbial load, and performance. African Journal of Agricultural Research, 12(3), 134–140.

Oke, O. E., Oladipo, B. O., &Bamgbose, A. M. (2017).Influence of floor types on broi ler productivity and welfare. Journal of Animal Production Research, 29(1), 10

–17.

Nworgu, F. C., Oduguwa, O. O., & Oni, A. O. (2018).

Effect of bedding *material on broiler performance and health. Nigerian Journal of Animal Science, 20(1), 75–83.*