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INFLUENCE OF SELECTED SUPPLEMENTS (PALM WINE YEAST, SPROUTED CORN, AND YOGURT) ON WEIGHT GAIN AND FEED CONVERSION RATIO IN BROILER CHICKENS (ARBOR STRAIN)

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ABSTRACT

This study aims to evaluate the effects of supplementing starter and grower feeds with selected supplements on the zootechnical performance (weight gain and feed conversion ratio) in Arbor broiler chickens. The chosen supplements are palm wine yeast, sprouted corn meal, and yogurt lactic bacteria. The experiment involved 220 one-day-old Arbor chicks, divided into 4 groups of 55 chicks each. These groups are arranged as follows: Group 1: C (Control), Group 2: PWY (palm wine yeast), Group 3: SCM (sprouted corn meal), and Group 4: YLB (yogurt lactic bacteria). The different supplements—palm wine yeast, sprouted corn meal, and yogurt bacteria—were incorporated into the feed at a rate of 3%. The formulated feeds were distributed to the chickens on a daily basis. The weight gain and feed conversion ratio were determined. After 8 weeks of experimentation. The results showed that among the three supplements studied, YLB proved to be the best, with a final average weight of 1451g, which is higher than those of the SCM (1315g) and PWY (1303g) supplements. The selected supplements appeared to be good growth promoters for chickens, particularly the yogurt lactic bacteria (YLB). The use of these supplements would certainly provide a significant added value to the poultry industry.

Keywords: Starter feed, Grower feed, Yeasts, Sprouted corn, Lactic bacteria.

1 INTRODUCTION

Poultry production represents an increasingly significant share of the supply of animal proteins to populations, particularly in tropical regions (Allanonto, 2010; Abdou and *al.*, 2020). Individuals engaged in this activity face enormous challenges, including the high cost of poultry feed. The poultry feed industry has long been dependent on expensive imported raw materials. In light of this, utilizing a maximum of cheaper local raw materials in the poultry sector could be a solution for Ivorian poultry farmers (Anonymous, 2001).

Thus, the study focused on natural sources of local dietary supplements that are readily available and capable of balancing chickens'rations. Optimizing productivity is the primary concern. The formulated feed was supplemented with elements aimed at maximizing the growth of broiler chickens. The choice was therefore made to focus on palm wine yeast, sprouted corn meal, and yogurt lactic bacteria.

This study thus aims to comparatively assess the effects of these selected supplements (palm wine yeast, sprouted corn meal, and yogurt lactic bacteria) on the weight gain and feed conversion ratio in Arbor broiler chickens.

2 MATERIAL

2.1 Biological Materials

The biological materials consisted of:

2.1.1 Chicks

The experiment involved 220 one-day-old Arbor broiler chicks sourced from ALCI (Abidjan, Côte d'Ivoire). The average weight of the chicks upon arrival was 45.6g.

2.1.2 Palm Wine Yeast

The source of the yeast was palm wine obtained from the market in the Abobo district (Abidjan, Côte d'Ivoire). This wine was used for yeast cultivation.

2.1.3 Sprouted Corn

The sprouted corn was obtained from the germination of corn grains sourced from the market in the Abobo district (Abidjan, Côte d'Ivoire).

2.1.4 Lactic Bacteria

The source of the lactic bacteria (Lactobacillus) was yogurt produced in the Laboratory of Nangui ABROGOUA University (formerly the University of Abobo-Adjamé) for the purposes of the study.

2.2 Technical Materials

The technical equipment included:

- A radiant heater
- A 15-horsepower electric hammer mill
- Plastic siphon drinkers (3 to 5 liters)
- Circular feeders with a diameter of 50 cm
- An electric mixer with a capacity of 400 kg
- An incubator measuring 94 cm x 52 cm x 141 cm = 689,208 cm^3
- A 20 kg capacity precision balance (0.1g accuracy)
- 200-liter barrels.

3 METHODS

3.1 Yeast Cultivation

For the cultivation of palm wine yeast, the following procedure was used. The palm wine was added to warm sugared water. The mixture was thoroughly homogenized. The resulting mixture was placed in a barrel, which was sealed hermetically and left to ferment for 2 to 3 days. Fifty percent corn bran and 50% crushed corn grains were added to the ferment. The mixture was then kneaded and dried. The resulting product was incorporated as a supplement to the base feed at a rate of 3%.

3.2 Corn Germination

The corn grains were sorted and soaked in water for 24 hours and then germinated for 72 hours. This germination was carried out in the laboratory on cotton bags at a temperature of 25°C. The germinated grains were then dried at 28°C for 48 hours. The dried grains were then ground. The resulting flour was incorporated into the base feed at a rate of 3%.

3.3 Yogurt Production

One (1) kg of powdered milk was diluted in two (2) liters of cold water. The mixture was stirred for a few minutes. Five (5) liters of hot water were added to the mixture and mixed until foam appeared. A container of "Yoplait Nature Sucré" yogurt was then incorporated. The resulting mixture was stirred for a few more minutes, then hermetically sealed and left to curdle for a whole day (24 hours). The next day, crushed corn grains were added to the yogurt, mixed, and dried. The resulting product was incorporated at a rate of 3% into the base feed as a supplement.

3.4 Chick Distribution

The chicks in the study were divided into 4 groups, each consisting of 55 chicks. The groups were designated as follows:

- Group 1 : C (Base feed (Control))
- Group 2 : PWY (Base feed + palm wine yeast (3%))
- Group 3 : SCM (Base feed + sprouted corn meal (3%))
- Group 4 : YLB (Base feed + yogurt lactic bacteria (3%))

3.5 Diet of the Chicks

The chicks in the study were fed two types of feeds:

- Starter feed rich in carbohydrates, proteins, vitamins, and minerals, provided to the chicks from 1 to 3 weeks;
- Grower-finisher feed, provided to the chicks from 4 to 8 weeks.

The study's supplements—palm wine yeast, sprouted corn meal, and yogurt lactic bacteria—were incorporated into the base feeds. The chicks from the different groups were fed daily at 8 AM, 3 PM, and 9 PM. The quantities given were the same for all groups and increased as the chicks grew. The composition of the experimental feeds is provided in Table I

Table 1: Composition of Experimental Foods

Ingredients (%)	Experimental foods			
	Group1 (C) (Control)	Group2 (PWY)	Group3 (SCM)	Group4 (YLB)
Palm wine yeast (PWY) (%)	0	3	0	0
Sprouted corn meal (SCM) (%)	0	0	3	0
Yogurt lactic bacteria (YLB) (%)	0	0	0	3
Corn (%)	41	41	41	41
Wheat bran (%)	9	9	9	9
Low rice flour (%)	12,2	12,2	12,2	12,2
Fish Meal (%)	9,5	9,5	9,5	9,5
Cottonseed cakes (%)	9,9	9,9	9,9	9,9
Copra cakes (%)	5,4	5,4	5,4	5,4
Shellfish (%)	9	9	9	9
Vitamin premix (%)	4	4	4	4
Total	100	103	103	103
Metabolizable energy (Cal/Kg)	3000	3145	3120	3099

3.6 Weighing in Chicks and Feed

The weight gain of the chicks is measured at the beginning of each week, early in the morning, before feeding and watering. The weighing involves taking the weight of the chicks in each batch using a scale. Then the average weight and weight gain for each batch are determined.

Weight Gain (WG) is the difference between the average weight of the current week (AW2) and the average weight of the previous week (AW1). It is expressed in grams (g).

$$\mathbf{WG} = AW2 - AW1$$

Before introducing the new feed, the amount of feed remaining from the previous day is weighed. These measurements will determine the amount of feed consumed and thus allow us to calculate the Feed Conversion Ratio (FCR) for each batch.

The Feed Conversion Ratio (FCR) is defined as the ratio between the amount of feed consumed and the total weight of the chicks

$$\mathbf{FCR} = \frac{\text{Amount of Feed Consumed}}{\text{Total Weight of Chicks}}$$

3.7 Health Monitoring

The health monitoring included the vaccination of the chicks against Gumboro disease, Newcastle disease (B1 strain), infectious bronchitis (H120 strain), and coccidiosis. Additionally, anti-stress agents were administered in the drinking water.

3.8 Statistical Analysis

After the various calculations, the results were analyzed using the STASTISTICA software: ANOVA test with $\alpha=0.05$. This comparative analysis allows for the determination of whether the obtained values are statistically equal at the 5% significance level. It also enables the ranking of groups based on their performance.

4 RESULTS AND DISCUSSION

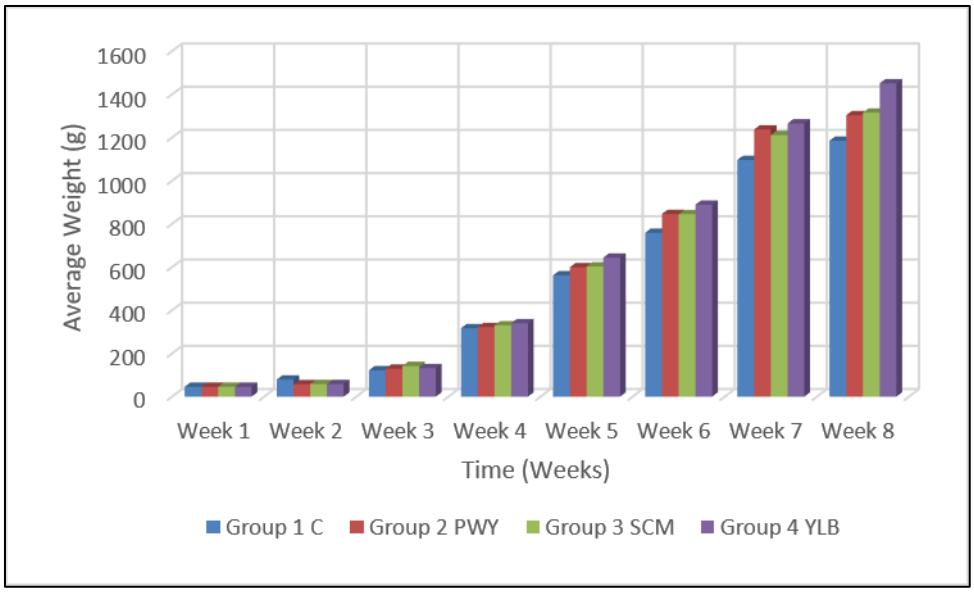

Figure 1: Average Weight Curves of the Different Groups in the Experiment

Based on these results, we can affirm that the supplemented groups performed better compared to the Control group, which received only the basic feed without any supplements.

Group 4 (YLB) emerged as the best among the four groups (Figure 1). This result can be attributed to the microorganisms (Lactobacillus and Streptococcus) present in yogurt, which are highly beneficial in animal nutrition (Bourgeois and Larpent, 1989 and 1996; Jacela and *al.*, 2010; Hofacre and *al.*, 2022). Indeed, it has been proven that Lactobacillus used as probiotics in feed promote the development of a balanced gut flora, thereby enhancing digestive functions and ensuring better nutrient assimilation (Vittorio and *al.*, 2005; Brugman, 2022) and overall growth of the animals (Hajati and Rezaei, 2010; Hume, 2011). Lactobacillus can convert various sugar sources (whey, silage, plant extracts, hydrolyzed starch) by enriching the medium with vitamins, amino acids, or enzymes (β-galactosidase) (Chassy, 1985; Chafia, 2006; Zheng and *al.*, 2020). Lactobacillus increases the production of organic acids in the digestive tract,

which modifies intestinal permeability, thus increasing the absorption of certain nutrients and improving growth performance (Vondruskova and *al.*, 2010; Fallah and *al.*, 2013; Shah and *al.*, 2024).

Group 3 (SCM) ranked second. This ranking can be explained by the fact that sprouted corn adds vitamins B1, B2, B3, B6, B9, and amino acids that were initially absent but provided by germination, such as lysine and tryptophan, which are known to play a significant role in growth (Dillon, 1989; Poitevin, 2020). Additionally, the contribution of calcium and phosphorus, two nutrients that serve as structural elements in the formation of the skeleton (bones and cartilage), is noteworthy. The α-amylase present in sprouted corn allows for the hydrolysis of starch grains in the feed into simpler sugars that are more readily assimilated by the chickens (Yang and *al.*, 2009; Sebai, 2021). Furthermore, the microorganisms present in sprouted corn hydrolyze triglycerides into glycerol and fatty acids through lipase action (Guiraud, 1998), increasing metabolic energy and thus ensuring good growth.

Following Group 3 is Group 2 (PWY). The group supplemented with palm wine yeast increased the amino acid content of the feed, particularly lysine, methionine, and cysteine, which are considered essential amino acids for growth. It is important to note that calcium, phosphorus, and zinc content, which is enhanced by the yeast in the feed, play a critical role in maintaining bones and overall body health (Coïc and Copperet, 1989; Lautrou, 2022). The use of yeast enriches the medium with proteins and vitamins, primarily B vitamins (thiamine, essential for carbohydrate and fat metabolism) (Kung, 2001; Auclair, 2001; Hot, 2025).

Group 1 (Control) ended up being the last in the experiment. The chicks in this group grew slower than those in the other groups. This group was only fed the basic feed without any supplementation. This feed merely provides the necessary elements (vitamins A, D3, E, and B2) and minerals (manganese, zinc, and copper) for the proper functioning and growth of the organism. However, this feed does not allow for optimization of production.

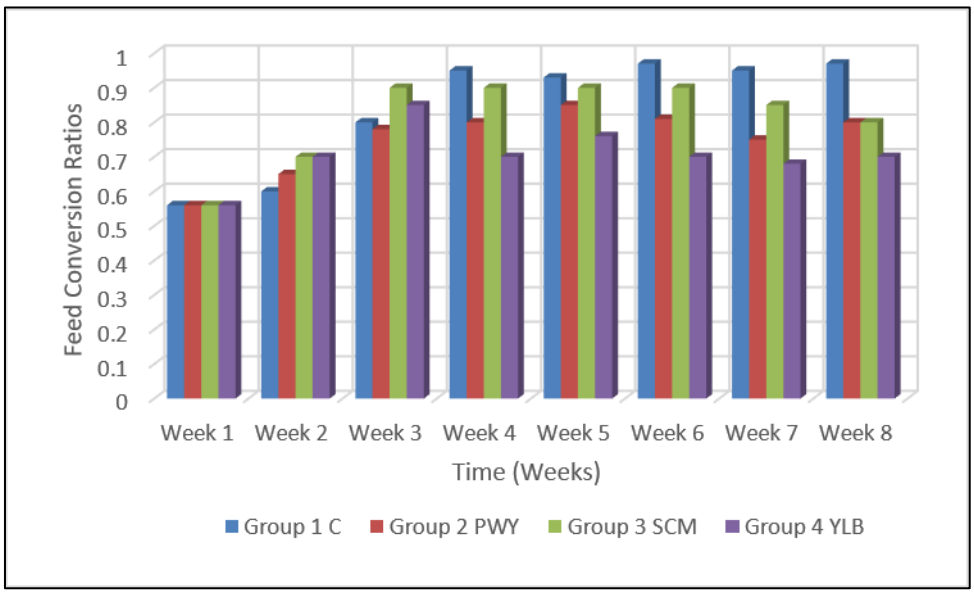

Figure 2: Feed Conversion Ratios of the Different Groups in the Experiment

The feed conversion ratios (Figure 2) show significant variations throughout the experimental period, which is particularly notable in the control group, characterized by a steady increase. The group supplemented with yogurt exhibited the lowest feed conversion ratio, which could be attributed to the use of Lactobacillus in the yogurt, enhancing the subjects' feed conversion by ensuring good nutrient assimilation and maximizing feed utilization (Ahmed I., 2006; Boceiri and *al.*, 2024). Following this group, the SCM and PWY groups ranked respectively in their feed conversion ratios.

5 CONCLUSION

At the end of this study, it is clear that the supplements used have a positive influence on the growth of Arbor broiler chickens. However, each supplement has a specific action on the host organism that makes it more or less effective than the others.

Yogurt, one of the supplements used, stands out as an excellent feed additive compared to the others.

Further research into these supplements is necessary. It should focus on the optimal quantities of these supplements and their antagonistic substances.

The results of this study could lead to a genuine optimization of productivity in various poultry farms and could certainly help significantly reduce the time required to reach slaughter weight.

STATEMENTS ON COMPLIANCE WITH ETHICAL STANDARDS

Disclosure of conflict of interest

There are no conflicts of interest.

Statement of ethical approval

K.C.K.Y. and L.G.B. designed the study. K.C.K.Y. contributed to data analysis and manuscript writing. All authors have read and approved the final version of the manuscript.

REFERENCES

[1] Allanonto Victor, 2010. Separate or mixed maize-based feed for broiler chickens in the cool season in Senegal. Veterinary medicine thesis. EISMV Dakar (Sénégal).

[2] ABDOU Harouna, LAOUALI Abdoulkadri et ROUGA ASSOUMANE Balkissa, 2020, « Free-range farming of laying hens: the case of poultry farms in Niamey and Tillabéri in the Republic of Niger», *Revue scientifique International Journal of Biological and Chemical Sciences*, Vol. 14, N°3, p. 848-858.

[3] Anonymous, 2001. Yeasts and animal feed. INRA. Paris. Pages 10-12.

[4] Bourgeois C. M., Larpent J. P., 1989. Food fermentation: Techniques and documentation. Lavoisier. Paris. p. 315.

[5] Bourgeois C. M., Larpent J. P., 1996. Food Microbiology. 2nd Edition. Food Science and Technology. Pages 36-40.

[6] Jacela J.Y., DeRouchey J.M., Tokach M.D., Goodband R.D., Nelssen J.L., Renter D.G., Dritz S.S., 2010. Feed additives for swine: Fact sheets – prebiotics and probiotics, and phytogenics. Journal of Swine Health and Production, 18(3): 132-136.

[7] Hofacre Charles, Raspoet Ruth, Auclair Eric, Rondel Elen, Gaydos TJ, Kiros Tadele. 2022. Effect of three probiotic products on broiler chickens subjected to a *Clostridium perfringens* necrotic enteritis challenge. Quatorzièmes Journées de la Recherche Avicole et Palmipèdes à Foie Gras, Tours, 9 et 10 mars 2022.

[8] Vittorio S.A., Mauro F., Carla B., Giovanna D.D., Giovanni S., Chevaux S., 2005. Effets de l'addition de Pediococcus acidilactici dans la ration de poulets de chair sur les performances zootechniques et la microflore intestinale. In: Proceedings des 6ème journées de la recherche avicole, St Malo (France), p. 208-211.

[9] Brugman Marie. 2022. Anti-inflammatory and immunomodulatory effects of prebiotics and probiotics : a literature review. Veterinary medicine and animal health. ⟨dumas-04105088⟩

[10] Hajati H., Rezaei M., 2010. The application of prebiotics in poultry production. International Journal of Poultry Science, 9(3): 298-304.

[11] Hume M., 2011. Food safety symposium: potential impact of reduced antibiotic use and the roles of prebiotics, probiotics, and other alternatives in antibiotic-free broiler production. Poultry Science, 90: 2663-2669.

[12] Chassy B. M., 1985. Prospects for improving economically significant lactobacillus strains by genetic technology. Trends in Biotechnology, 3, p. 273-275.

[13] Chafia S., 2006. Effect of adding probiotics to diets on the zootechnical performance of broiler chickens. Master's thesis. Lakhdar University of Batna.

[14] Zheng Jinshui, Wittouck Stijn, Salvetti Elisa, Franz Charles M A P, Harris Hugh M B, Mattarelli Paola, O'Toole Paul W, Pot Bruno, Vandamme Peter, Walter Jens, Watanabe Koichi, Wuyts Sander, Felis Giovanna E, Gänzle Michael G, Lebeer Sarah, 2020. A taxonomic note on the genus Lactobacillus: Description of 23 novel genera, emended description of the genus Lactobacillus Beijerink 1901, and union of Lactobacillaceae and Leuconostocaceae. Int. J. Syst. Evol. Microbiol. 70: 2782-2858.

[15] Vondruskova H., Slamova R., Trckova M., Zraly Z., Pavlik I., 2010. Alternatives to antibiotic growth promoters in prevention of diarrhoea in weaned piglets: a review. Veterinari Medicina, 55(5): 199-224.

[16] Fallah R., Kiani A., Azarfar A., 2013. A review of the role of five kinds of alternatives to in-feed antibiotics in broiler production. Journal of Veterinary Medicine and Animal Health, 5(11): 317-321.

[17] Shah AB, Baiseitova A, Zahoor M, Ahmad I, Ikram M, Bakhsh A, Shah MA, Ali I, Idress M, Ullah R, Nasr FA, Al-Zharani M. 2024. Probiotic significance of Lactobacillus strains: a comprehensive review on health impacts, research gaps, and futurs prospects. Gut Microbes. 2024 Jan-Dec ;16(1) :2431643.

[18] Dillon J. C., 1989. Cereal products in the diet of young children in Africa: cereals in hot regions. Aupelf-Uref, Éditions John Libbey Eurdent. Paris. Pages 299-307.

[19] Poitevin Blanche. The benefits of sprouted seeds in animal feed. Life Sciences [q-bio]. 2020. ⟨dumas-05076381⟩

[20] Yang Y., Iji P., Choct M., 2009. Dietary modulation of gut microflora in broiler chickens: a review of the role of six kinds of alternatives to in-feed antibiotics. World's Poultry Science Journal, 65(01): 97-114.

[21] Sebai Hanane. 2021. Alpha amylase assay of two wheat varieties during germination. Master's thesis. University of Tissemsilt. Algérie.

[22] Guiraud J. P., 1998. Food microbiology. Dunod. Paris. Pages 101-102.

[23] Coïc Y., Copperet M., 1989. Trace elements in agriculture and livestock farming. INRA. Paris. Pages 104-106.

[24] Lautrou Marion. 2022. Modeling of calcium and phosphate requirements and strategies for improving phosphorus utilization in growing pigs. Food and Nutrition. Paris-Saclay University; Laval University (Québec, Canada), French. ⟨NNT : 2022UPASB011⟩. ⟨tel-03920784⟩

[25] Kung L. Jr., 2001. Direct-fed microbials and enzymes for dairy cows. Department of Animal & Food Sciences, University of Delaware.

[26] Auclair, E., 2001. Yeast as an example of the mode of action of probiotics in monogastric and ruminant species. Ciheam-Iamz, p. 45-53.

[27] Hot Marie. 2025. Nutritional yeast: the essential source of B vitamins. DocMorris. DoctiPharma. https://www.docmorris.fr/mag/levure-nutritionnelle-la-source-incontournable-de-vitamines-du-groupe-b-Z61cJpWJ?srsltid=AU7gw4Xi1ubPxYG_IAE2oOKUrDqsbNBNxDayTDccqevXhsoxFWdRI0W3. Accessed on 16 September 2026.

[28] Ahmed I., 2006. Effect of probiotics on broiler performance. International Journal of Poultry Science, 5(6), p. 593-597.

[29] Boceiri Adda, Merouane Abdelwadoude Dhaia Eddine, Messani Abdelghani. 2024. Study of the microbiological and physicochemical quality of a flavored yogurt enriched with fermented whole durum wheat. Master's thesis. Ibn Khaldoun University–Tiaret, Algérie. p71.