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Review

Use of fish waste to silage preparation and its application in animal nutrition

Raziye R, Bahareh SH, and Parastoo P.

Online J. Anim. Feed Res., 13(2): 79-88, 2023; pii: S222877012300013-13

DOI: <https://dx.doi.org/10.51227/ojafnr.2023.13>

Abstract

In recent years, global aquaculture production has increased, leading to an increase in fish waste. These wastes, which in many cases are disposed directly without trying to take advantage of them, are a major environmental and economic problem that may affect the sustainability of the fishing and aquaculture industry. Therefore, their use seems necessary to reduce pollution and make the aquatic industry more efficient. Most of well-known technologies for using fish waste are not economically attractive due to the need for high initial investment. But an easy and inexpensive way to use these wastes is to convert them into silage. Fish silage is a product of good nutritional quality included in animal diets as part of the feed. Fish silage is a liquid product made from whole fish or parts of it to which lactic acid-producing acids, enzymes or bacteria are added, and the liquefaction of the material indicates the action of enzymes present in the fish. Therefore, the purpose of this review is to investigate the use of aquatic waste for preparing silage and the possibility of using it in animal nutrition.



Keywords: Fermentation, Fish by-product, Fish silage, Protein hydrolysis, Silage.

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Research Paper

Impact of phytogetic formulation on performance and fatty liver disease of broiler chickens

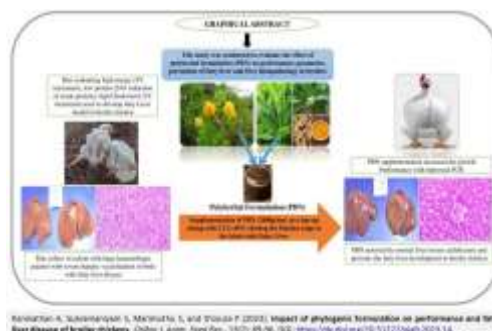
Kaninathan A, Subramaniyam S, Marimuthu S, and D'souza P.

Online J. Anim. Feed Res., 13(2): 89-96, 2023; pii: S222877012300014-13

DOI: <https://dx.doi.org/10.51227/ojafnr.2023.14>

Abstract

This study was conducted to evaluate the effect of polyherbal (phytogetic) formulation (PHF: containing *Acacia nilotica* and *Curcuma longa*) on performance parameters, liver histopathology and prevention of fatty liver in broilers. 700 day-old chicks were randomly distributed to seven groups (10 replicates / group; 10 birds each), namely positive control (T1) fed with basal diet + choline chloride (CCL) 60% (1000g), negative control (T2) fed with high energy (5% increment), low protein (24% reduction), high cholesterol (2% increment) diet, T3 (T2 + PHF; 1000g-full cycle), T4 (T2 + PHF; 2000g-full cycle), T5 (T2 + CCL 60% (1000g-full cycle)), T6 (T5 + PHF; 1000g-grower and finisher stage), T7 (T5 + PHF; 2000g-finisher stage). Average daily gain (ADG; g), average daily feed intake (ADFI; g) and feed conversion ratio (FCR) were calculated at 1-14 days, 15-28 days, 29-42 days, and 1-42 days. Serum triglycerides analysis, gross and histopathological observations of liver morphology were performed for the samples of control and experimental groups on day 42. The performance parameters; ADG, ADFI, FCR, and liveability were found to be improved in all the groups as compared to the negative control group. However, better performance was observed in PHF (2000g) top-up group (during the finisher stage) as compared to the negative control group. Serum triglyceride levels were increased non-significantly as compared to the negative control indicating that more fat is mobilized from liver to serum. In addition, PHF supplementation at 2000g during the finisher phase had restored the liver tissue architecture as well as improved the liver score when compared to the negative control group. It is concluded that PHF (2000g/ton) during the finisher stage can be used as a top-up to improve the performance parameters as well as to prevent the fatty liver condition in broiler chickens.



Keywords: Basal diet, Broiler chicken, Choline chloride, Herbal formulation, Triglycerides.

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Research Paper

Comparative effect of vitamin complex and orange extract on physiological and blood parameters of transported pullets in humid tropics

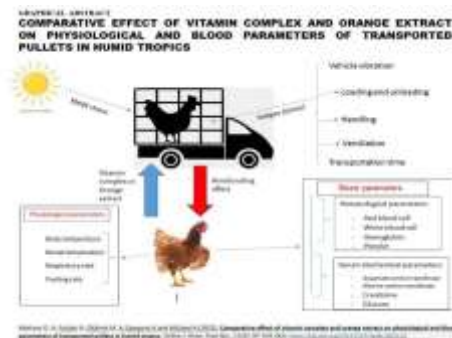
Mathew O. A, Foluke A, Olufemi M. A, Opeyemi A and Micheal A.

Online J. Anim. Feed Res., 13(2): 97-104, 2023; pii: S222877012300015-13

DOI: <https://dx.doi.org/10.51227/ojaf.2023.15>

Abstract

The comparative modulating effects of synthetic and natural source of ascorbic acid (AA) were investigated on transporting pullet birds in the hot-dry season of humid tropics. Ninety-six 16 weeks Isa-brown pullets were randomly allotted in a completely randomized design into four treatments of oral vitamin supplementation 5 days before transportation i.e; T₁ (ordinary water), T₂ (synthetic vitamin), T₃ (30% citrus-sweet orange), T₄ (50% citrus-sweet orange). Birds were crated and transported for 3 hrs covering 135km at 45km/hr. Meteorological values were monitored during the journey and no mortality was recorded. The results revealed that treatments had a significant effect ($p < 0.05$) on measured physiological parameters [body temperature (BTC), rectal temperature (RTC), respiratory rate (RR) and panting rate (PR)], hematological parameters and measured serum biochemical parameters as compared to the control group (T₁). The treatments group of orange at different inclusion ratios (T₃ and T₄) compared well with pullet birds on oral supplementation of synthetic vitamin (T₂) and were significantly different ($p < 0.05$) from birds on control water treatment (T₁). Birds on control (T₁) had the highest values for all measured physiological parameters which were significantly different from other groups ($p < 0.05$). Birds in the control treatment (T₁) were more stressed as compared to other treatment groups, indicated by increased hematological and serum biochemical parameters except for a decrease in hemoglobin (Hb) as compared to other treatments. It can be deduced from this study that the oral supplementation of natural source of ascorbic acid (*Citrus sinensis*) and synthetic vitamin supplement helps to ameliorate the effect of transportation stress. *Citrus sinensis* extract can be a suitable alternative that is readily available for farmers and stakeholders.



Keywords: Ascorbic acid, Physiological measures, Pullets, Synthetic vitamin, Transportation stress.

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Research Paper

Physico-chemical properties and digestibility of ammoniated Bambara groundnut (*Vigna subterranea*) shell for ruminants

Putri R, Dewi SP, Kurniawan FA, Ridla M and Retnani Y.

Online J. Anim. Feed Res., 13(2): 105-110, 2023; pii: S222877012300016-13

DOI: <https://dx.doi.org/10.51227/ojaf.2023.16>

Abstract

This experiment was conducted to evaluate the physical properties, chemical quality, and digestibility of the ammoniated Bambara groundnut (*Vigna subterranea*) shell as ruminant feed. Bambara groundnut shell (BGS) were collected, ground with a grinder machine, afterward added 0, 3 and 5 (% DM) urea levels into 500 g of sample. Samples were mixed until homogeneous, then put into plastic bottles, after that stored for 7 and 14 days. Opened, dried in the oven at 650C for 48 hours and ground. A completely randomized design (CRD) was used with 5 treatments of BGS ammoniation (T₀= control, T₁= BGS + 3% urea and 7 days storage, T₂= BGS +5% urea and 7 days storage, T₃= BGS + 3% urea and 14 days storage, and T₄= BGS + 5% urea and 14 days storage time), 4 replications each. The result of this study showed that the increase of urea level and days storage time, can decrease crude fiber, neutral detergent fiber, acid detergent fiber, and hemicellulose contents of all samples ($P < 0.05$) and increase the value of bulk density, tapped density, in vitro dry matter digestibility and in vitro organic matter digestibility in comparison to untreated samples ($P < 0.05$). It was concluded that the T₄ was the best treatment. The BGS ammoniated with 5% urea for a period 14 days of storage causes the lowest value of crude fiber, neutral detergent fiber, acid detergent fiber, and hemicellulose, and also causes the highest value of bulk density, tapped density, crude protein, in vitro dry matter digestibility and in vitro organic matter.



Keywords: Ammoniation, Fibrous feed, Bambara groundnut shell, Ruminant, Urea.

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Research Paper

Impact of phase-feeding programs on performance of broiler chickens in Nigeria

Ebegbulem VN, Archibong EE, Kperun ThN, Izuki ED and Udayi MA.

Online J. Anim. Feed Res., 13(2): 111-115, 2023; pii: S222877012300017-13

DOI: <https://dx.doi.org/10.51227/ojafr.2023.17>

Abstract

Phase-feeding is the feeding of several diets for a relatively short period of time to specifically meet an animal's nutrient requirements. The study evaluated the effect of different phase feeding methods on growth and carcass characteristics of broiler chickens. A total of 120-day-old chicks of the FIDAN strain were assigned to four dietary treatments of 30 birds each, 15 birds per replicate. Birds were fed at different phases: Phase 1 were fed broiler starter diet alone for 8 weeks; Phase 2 birds were fed starter diet from 0-4 weeks and 1st finisher diet from 5-8 weeks. Phase 3 birds were fed starter diet from 0-3 weeks, 1st finisher diet from 4-6 weeks and 2nd finisher diet from 6-8 weeks. Phase 4 birds were fed starter diet from 0-2 weeks, 1st finisher diet from 2-4 weeks, 2nd finisher diet from 4-6 weeks and 3rd finisher diet from 6-8 weeks of age. Result no significant differences ($p > 0.05$) between the groups in body weight gain (2.91–2.47 kg/bird) and feed conversion ratio (2.03–2.34). Total feed intake was highest in phase 1 (6.70 kg/bird) followed by phase 2 birds (6.41 kg). Dressed weight in Phase 1 was significantly ($p < 0.05$) higher than others, followed by Phase 2. Dressing percentage did not differ significantly ($p > 0.05$) between the groups. Feed cost between treatments was however significantly ($p < 0.05$) different, Phase 1 diet being costliest. Phase-feeding using phase 4 regime elicited reduced dietary cost without compromising optimal performance of the birds.

Keywords: Diet; Feed cost; Feed efficiency; Nutrition; Phase-feeding.

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Ebegbulem VN, Archibong EE, Kperun ThN, Izuki ED and Udayi MA (2023). Impact of phase-feeding programs on performance of broiler chickens in Nigeria. Online J. Anim. Feed Res., 13(2): 111-115, 2023; pii: S222877012300017-13

Research Paper

Evaluation of fermentation progress during storage of millet stovers silage based on pH-indicators

Korombé HS, Bado VB, Abdou N, Umutoni C, Ibrahima A, Gouro AS.

Online J. Anim. Feed Res., 13(2): 116-126, 2023; pii: S222877012300018-13

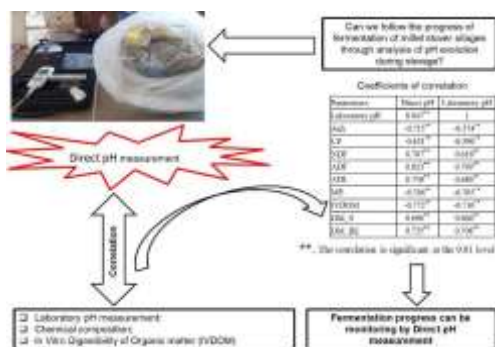
DOI: <https://dx.doi.org/10.51227/ojafr.2023.18>

Abstract

This study aimed at evaluating the fermentation levels of pearl millet [*Pennisetum Glaucum* (L.) R. Br] stovers silage during storage based on pH evolution. A completely randomized experimental design in a 6×2×2 factorial scheme with three replications for each treatment was used to evaluate three factors (6 cultivars, 2 different cutting stages, and with or without salt addition to the cultivars). The silages were prepared in plastic bags and stored for 60 days at room temperature. The results revealed that the pH values of the treatments were significantly ($P < 0.05$) higher on the first day than in the other periods and a rapid drop in pH, with significant differences ($P < 0.05$), to levels below 4 was obtained on the third day of storage for the majority of local Sadoré and Siaka Millet silages (Niger). Four types of pH evolution were recorded and the variation was statistical significant among cultivars. Also, analysis of the relationships between pH, chemical composition parameters and In Vitro Digestibility of Organic Matter (IVDOM) showed that increasing pH values were associated with increasing Dry Matter content of stovers before silage (DM_BE), Dry Matter content of silages (DM_S), Neutral Detergent Fiber (NDF), Acid Detergent Fiber (ADF), Acid Detergent Lignin (ADL) values and decreasing Crude Protein (CP), Metabolizable Energy (ME), IVOMD, and Ash values. However, the pH values obtained for all silages showed that all the millet stovers used were suitable for silage. At the maturity stage, it is thus possible to use the grain for human consumption and to ensile the stovers for animal feed. This study also shows that monitoring the pH in the silo makes it possible to evaluate the quality of the fermentations to avoid losses on the farms.

Keywords: Dual-purpose varieties; Harvesting stage; Monitoring of pH; Silage; Stovers conservation.

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Research Paper

Effect of three different processing techniques of soybean on nutritional and growth performance of Japanese quail (*Coturnix japonica*)

Ekeocha A, Aganga A, Okiki P, Olubiyo P, Oluwadele J.

Online J. Anim. Feed Res., 13(2): 127-131, 2023; pii: S222877012300019-13

DOI: <https://dx.doi.org/10.51227/ojafr.2023.19>

Abstract

The experiment investigated the effects of various soya bean groups (boiled, fermented, and roasted) on Japanese quail at 3 weeks old. 160 Japanese quail were randomly assigned to four treatments (control, boiling soya beans, fermented soya beans, roasted soya beans) with four duplicates each. The 12-week trial lasted. Data on weekly body weights and feed conversion ratio were analyzed using analysis of variance (ANOVA) and Tukey's honestly significant at 5% probability test. The result shows there are significant differences in weekly weights of Japanese quail at weeks 1(828.12-1083.24g), 2(1026.47-1362.02g), and 3(1325.69-1528.20g) with the highest observed in birds in treatment 2(boiled soya beans). The maximum FCR was in week 1 for all treatments, while the lowest was in treatment 3 for weeks 5 and 9 (0.83; $P < 0.005$). Week 1 to week 12 feed conversion ratio decreases. The birds' feed conversion ratios varied significantly ($P < 0.05$). The quails in treatment 4 (roasted soybeans) had the greatest weekly weight after the trial (1742.34g). Thus, quails in treatment 3 (roasted soybean) had the best development performance than the control, boiled and fermented. So it advised that roasted soybean can be an efficient diet for Japanese quails for maximum performance.



Keywords: Growth performance, Feed conversion ratio, Nutrient; Processing techniques, Roasted soybean.

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Research Paper

The effects of different feeding conditions on performance and carcass characteristics of pekin, local, and crossbred ducks

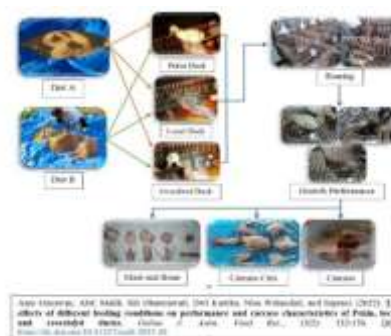
Aam G, A. Malik, Siti D, Dwi K, Nisa W, and S.

Online J. Anim. Feed Res., 13(2): 132-136, 2023; pii: S222877012300020-13

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Abstract

The objective of the study was to investigate performance and carcass quality of Pekin, local, and cross-breed ducks raised under different feeding (varied in protein and fiber levels). A total of 180 male ducks aged 14 days, consisting of 60 Pekin ducks, 60 local ducks (Mojosari), and 60 cross-breed (Mojosari + Alabio) ducks were used in the study. Each type of duck was randomly divided into 36 units of cages, each of which was filled with 5 ducks. The data obtained from the study were analyzed according to a completely randomized design with 2×3 factorial pattern. Initial body weight of local ducks at 14 days was significantly ($P < 0.01$) lower than that of Pekin and cross-breed ducks, while, Pekin ducks were higher than the other two types of ducks. On the other hand, feed consumption was significantly ($P < 0.01$) influenced by the type of diet and breed. While carcass percentage was significantly ($P < 0.01$) influenced by breed and diet types. The percentage of Pekin duck carcasses that received diet A (low protein and fiber) was significantly different ($P < 0.05$) from cross-breed ducks, in comparison to local ducks. In conclusion the feed conversion rate and final body weight for diet A showed better results than diet B (high protein and high fiber) on the Pekin duck. Meanwhile, the carcass characteristics like abdominal fat of diet B (for pekin, local duck, and cross breed) were better than diet A (for Pekin and local duck). It's suggested to use Pekin ducks with low protein and low fiber diet to get the better performance, in compared with local ducks which needs high protein and high fiber content in diet.



Keywords: Carcass characteristics, Cross-bred birds, Nutrients, Pekin Duck, Performance.

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Research Paper

Antioxidant activity of raw and cooked onions in rabbit doe nutrition

Tawfeeq AA, Shallal EN, Abdulwahid AM and Aldahham BJM.

Online J. Anim. Feed Res., 13(2): 137-142, 2023; pii: S222877012300021-13

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Abstract

The aim of this research is to examine how raw and cooked onions affect some antioxidant enzymes and some tissues in female rabbits. Twenty-four female albino rabbits weighing (1-1.5 Kg), (5-6 months age), non-pregnant, were used for the experiment, and they were divided into three groups for a duration of 28 days. A 20 g/kg raw onion and same amount of cooked onion were added to the second and third groups' diets respectively for comparison of results with control groups without any addition of onion. Results showed that diets supplemented with raw and cooked onion significantly increased the superoxide dismutase (SOD) activity. The cooked onion group showed normal and no pathological changes in liver, kidney, and heart tissues, while liver tissues of both control and raw onion groups suffered extreme congestion in the central veins of the liver lobules and in kidney tissues of only control rabbits, developed hemorrhagic foci was observed. In the control and raw onion groups, the heart tissue showed the development of hemorrhagic foci and necrosis in the heart muscle fibers. In conclusion, both raw and cooked onions boosted the activity of SOD enzyme, but the cooked onions showed to be more effective than raw at protecting liver, kidney, and heart tissues against cell necrosis caused by oxidative processes.



Keywords: Cooked onion, Oxidative stress, Rabbits, Superoxide dismutase, Tissue.

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Research Paper

The quality of fermented rice straw with *Trichoderma viride* inoculum

Badat M, Umi K, Hilarius Yosef S, Rifa'I.

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Abstract

The Rice straw has several nutritional weaknesses, namely its high silica and lignin content, and its low level of protein, minerals and vitamins, so the impact on digestibility is also low. Aim of present study was to evaluating nutritional efficacy of rice straw after fermentation with *Trichoderma viride*. The study was conducted by using complete random design. There were three different treatments with four replicates for each treatment. Fermented rice straws were treated with varying concentrations of *Trichoderma viride* inoculum as follows; 0.5% (T1), 1% (T2), and 1.5% (T3). Fermented rice straw's nutrients, including dry ingredients, organic material, crude fiber, crude protein, dry matter digestibility coefficients, and organic matter digestibility coefficients were measured in this study. P3 (1.5% of *T. viride*) treatment performed a proper nutrient, with 80.02% dry ingredients, 80.03% organic materials, 31.68% crude fiber, 5.72% protein, 38.46% dry matter digestibility coefficient, and 61.05% organic matter digestibility coefficient. In conclusion, using 1.5% *Trichoderma viride* to improve the quality of rice straw, as stimulator of fermentation process can be efficient in ruminant or non-ruminant nutrition.



Keywords: Agricultural by-product; Crude fiber; Digestibility; Ruminants; *Trichoderma viride*.

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Effects of substitution of fermented chicken litter with concentrate on nutrient digestibility and performance of sheep

Christiyanto M, Pangestu E, Nuswantara LK, Surono, and Utama CS.

Online J. Anim. Feed Res., 13(2): 148-152, 2023; pii: S222877012300023-13

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Abstract

The study aimed to investigate the effects of supplementing fermented chicken litter on feed consumption, nutrient digestibility (dry matter/DM, organic matter/OM, crude fiber/CF, extract ether/EE, crude protein/CP), total digestible nutrients (TDN), and average daily gain (ADG) in sheep. A completely randomized design with 4 treatments and 3 replications, namely T0 = concentrate without the addition of fermented litter, T1 = 90% concentrate + 10% fermented litter, T2 = 80% concentrate + 20% fermented litter, T3 = 70% concentrate + 30% fermented litter and T4 = 60% concentrate + 40% fermented litter was used. The parameters studied were dry matter digestibility (DMD), organic matter digestibility (OMD), extract ether digestibility (EED), crude fiber digestibility (CFD), crude protein digestibility (CPD), TDN, feed consumption and average daily gain. The results revealed that sheep fed different levels of fermented litter did not affect OMD, DMD, EED, CPD, CFD, TDN, dry matter consumption, and average daily gain (ADG). It was concluded that fermented chicken litter can be incorporated in sheep diet, without considerable negative effects.

Keywords: Digestibility, Feed, Fermentation, Litter, Sheep.

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