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Alternative food for broiler chickens: an overview

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Abstract: This work presents an approach on alternative foods found today for broilers, since the addition of these in the nutrition of these birds is extremely advantageous, because it reduces dependence on commodities, such as soybeans and Corn. From research carried out, we have more prominently the foods cited in this work as, bran and sunflower pie, coconut bran, chestnut bran, almond and cashew pulp, manioc shavings, sugar cane yeasts and baking waste. For some authors the bran and sunflower pie have the problem of having low lysine content; its fiber and protein content is between 25% to 26% gross fiber and 29% to 42% of crude protein. His dietary addition ranges from 5%, 18% and 20% based on the age of the birds. The coconut bran has in its constitution protein content around 20% to 25% and gross fiber: 10% to 12%, for having high amount of oil may have problems with decomposition, but works showed that up to 20% did not significantly damage the performance Of the birds has not altered the housing characteristics. Just like the coconut bran, the chestnut bran has good indications for animal feed. Cassava zest is highly carbohydrate-rich, mainly starch-like, which characterizes it as an energetic food, an important source of energy, an essential component of chicken feed. The yeast extract promotes desirable performance and proper functioning of the intestinal mucosa, and consequently in the absorption of nutrients, this is explained due to the yeast extract containing free amino acids that participate in the Division and Growth Cellular in the immune system and help maintain animal health. It is therefore concluded that alternative foods are an excellent alternative to the use in broiler diets, however the pioneering foods should not be completely replaced, in view of the digestibility of most foods Alternative is low, which decreases the animal performance at the end.
Keywords: Animal nutrition; Alternative food; Food conversion.

Introduction

Today the Brazilian poultry is among the main activities that move the economy of agribusiness in the country. Brazil is the world's leading global exporter of chicken meat and third largest producer, which makes the activity of extreme importance for poultry producers.

Although the activity is profitable, the costs of food and the monopolization of certain foods in the production of rations, make the profit of the farmers increasingly smaller, as it puts Opalinski (2006) "Traditionally the formulations of rations are Constituted, almost entirely, by maize, as an energy source and soybean bran, a protein base". These days this is still visible, although there are numerous studies with the use of alternative foods for the production of broilers.

Maize and soy are two agricultural commodities widely used in poultry farming and in human consumption; the functionality of these foods promotes the high cost for obtaining and using as a source in the diets of birds. Although the costs are not new to farmers, they do not have alternative food options on the market, or they are integrated into companies and must follow internal standards.

Because of this, this review aims to raise a theoretical reference on alternative foods in the production of broilers, in order to subsidize poultry, entrepreneurs of the area or else, future investors of the cutting poultry for the nutrition of Alternative form and lower production cost.

Importance of nutrition for the production of broilers

The poultry production grows at an accelerated pace and with it the competition in the market. Increasing demand for food is increasingly prevailing, as in the case of meat, especially chicken that increases astonishingly, due to economic factors, considering its lower price compared to other meats. Another relevant factor is the nutritional value that the

product presents, considering also its high acceptance in the food habit of the society as a whole.

In view of this increasing demand and evolution of the creation of broilers, there is the need for efficient animal nutrition systems that together with other factors such as, genetic improvement and management, can optimize and match the needs Of the market, whether internal and external, originating from the great demand for exports of the meat.

In this way, the use of nutritious and low-cost food for the producer is justified, which in addition to generating productive gains, can also meet the needs and resources of the property.

Alternative Food

Despite the traditional barrier in poultry nutrition, due to the great use of agricultural commodities like soybeans and maize, the use of alternative foods comes to break that vision. The use of "new foods" that can demonstrate use potential for food and less cost of acquisition, will certainly be well accepted by the producer of cutting poultry.

Among the countless foods possible to be used for the feeding of broiler chickens, some products that are currently being tested or that have already been published in recent scientific work are listed, and they are: the Bran and the pie of sunflower, coconut bran, chestnut bran, almond and cashew pulp, manioc shavings, sugar cane yeasts and baking waste.

Sunflower Pie and Bran

The Sunflower (*Helianthus annus* L.) is a plant widely adapted to different locations, climatic conditions, diseases and pests. It presents the ability to produce high quantity of oilseeds, using them for the manufacture of biodiesel. When processed (grinding), a residue (bran) is left, used for animal feed, including broiler chickens (BOZUTTI, 2009).

The sunflower bran, originating from the milling of the Sunflower seed, is an important source of fiber and protein, and may present between 25% to 26% of gross fiber and 29% to 42% of crude protein (TAVERNARI, et al., 2010 & TAVERNARI, et al., 2009).

According to Bozutti (2009), the Sunflower Bran presents proteins rich in amino acids Sulphur, however it is deficient in lysine, an amino acid extremely important for the diet of broilers, which consequently should be supplemented Separately in the ration. The author also places that the high values of fiber of the sunflower Bran end up being a limiting factor in the use of the same for broilers, which provides low digestibility of the material and low energy metabolizable.

The use of Sunflower bran as a single ingredient in the diet of broilers is still restricted due to its limiting factors. However, in a study conducted by Tavernari et al. (2009 & 2010), they show the possibility of use in rations by up to 20% without affecting the yield of carcass and performance of the chicken. In addition, in early stages, depending on the price, it becomes advantageous to use up to 5% of sunflower bran in the chicks ' ration. The authors also emphasize that diets that contain high fiber content, it is acceptable to add vegetable oil as an additional energy source.

It is extremely important that the energy balance, together with the protein content of a ration, is properly balanced so that broilers do not have their development in the different phases affected (LIMA et al., 2012). Regarding the use of sunflower pie in the broiler diets, Lima et al. (2012), considered the nutritional value lower than that of the sunflower bran, due to its high fiber content, but which can still be used in diets for broilers , it is recommended to add up to 18% in rations from 20 to 34 days of age.

According to Pinheiro et al. (2002), it puts that sunflower pie can be an alternative to feeding broilers. According to the author, it is possible to use in partial substitution of energy and protein foods, such as soybeans and maize, in proportions of up to 15%.

Coconut Bran

The Coconut tree (*Cocos nucifera* L.) is a predominant plant in northeastern Brazil, especially in coastal regions. Its fruit, called Coco, is widely used because of its numerous food, industrial (fiber) applications, and among others. One of the industrial uses is the extraction of coconut oil, generating as a byproduct the bran, used as an alternative food for broiler chickens (PASCOAL et al., 2006).

The coconut bran is a mixture of the pulp with the Peel, which gives it the white coloration to light brown. It has in its constitution protein content around 20% to 25% and gross fiber from 10% to 12%. By having, high amount of oil can have problems with deterioration (PASCOAL et al., 2006).

Bastos et al. (2007), in a study with 576 birds, with different levels of coconut bran, ranging from: 0.0%; 3.0%, 5.0%; 7.0%; 10.5%; 14.0% and 17.5% concluded that the coconut bran can be used for feeding broilers from the second week of age, from 7 to 21 days with a maximum addition of up to 5% in feed. In addition, over the course of 21 to 42 days of bird development can increase up to 17.5%.

In similar study carried out by Freitas et al. (2011), with 325 birds in early stages, testing different levels of coconut bran: 0.0%, 5.0%, 10.0%, 15.0% and 20.0%. It was possible to observe that in all different stages of creation, the substitution at levels of up to 20% did not significantly damage the performance of the birds or altered the carcass characteristics. According to the economic study carried out, the replacement of the soybean bran protein by the coconut bran was economically viable up to the level of 20%. Therefore, rations for broilers, with soybean proteins, are subject to substitution by rations containing 20% of coconut bran.

Cashew Nuts

Chestnut is the true fruit of the cashew tree (*Anacardium occidentale* L.), a plant originating in the north and northeast of Brazil and highly exploited in these regions. It is the main source of income, mainly in the northeastern region, in times of drought, highlighting itself as the main producing region of the country (SOARES, et al., 2012).

The cashew presents in its constitution the chestnut that in turn possesses the almond. Through the liquid of the chestnut shell and the peduncle or fruit, the juice and bagasse (cashew pulp) are obtained, which are commonly marketed (RAMOS, 2005).

The cashew bran consists of fragments of almonds (cashew seeds) and has in its Constitution high energy value due to the presence in its composition of high fat rate and also high quantity of proteins (22% to 38% of PB), and can replace Partially corn and soy bean in the broiler feed (FREITAS et al., 2006). However, it also contains anti-nutritional factors, most specifically tannic acid, which in large quantities can affect the development of broiler chickens (RAMOS et al., 2006).

In a study carried out using, with 720 chickens, with concentrations of: 0.0% 5.0%, 10.0%, 15.0%, 20.0% and 25.0% of cashew nut bran in the feed. The authors concluded that the treatments did not influence the consumption of poultry feed. However, the increase of cashew nut bran in the feed promoted linear increase in weight gain, at all stages, and linear improvement in food conversion, both in the initial phase as well as in the total period (FREITAS et al., 2006).

In relation to the control, during the initial phase the feed-fed birds with 25% bran showed greater weight gain and better food conversion. In the final phase and the total period of creation, the conversion improved from 10% inclusion, while the weight gain was higher from 15% inclusion. Housing yield and abdominal fat have not altered; the economic indexes improved with the inclusion of the cashew bran. In this way, it is possible to say that the cashew bran can be included in the broiler rations in ratios of up to 25%.

In another study conducted by Freitas (2011), using Cashew almond bran, during the initial phase of chickens (1 to 21 days old) it was used for the experiment 320 chickens in initial development and different concentrations (0.8%, 16.0% and 24.0%) Of Bran in the ration. The author concluded that the almond bran of the cashew Nut for broilers (1 to 21 days) is feasible up to 24% inclusion in diets. Another pertinent consideration is that the use of cashew nuts Almond bran is conditional on the price of that by-product.

In the case of cashew pulp, in studies carried out by Ramos (2005), using 320 chickens with 25 days of age, concentrations of pulp in the proportions: 0.0%, 5.0%, 10.0% and 15.0%. It was possible to conclude that the addition of up to 15% of dried cashew pulp in feed did not influence the consumption of rations, weight gain and the main characteristics of broiler carcasses.

The food conversion, however, worsened and the economic viability (gross income and average gross margin) was lower with the increase of the dehydrated pulp of cashews in the rations. The use of the dehydrated cashew pulp for broilers is conditional on the price of the conventional ingredient (maize) and vegetable oil on formulation.

Cassava Zest

Cassava (*Manihot esculenta* Crantz) is a plant typically Brazilian and widely disseminated by the country. Its main use is the root, being rich in carbohydrates, mainly in starch, characterizing it as an energetic food. For the animal feed it can be used both the root and the aerial part, however for the broiling chicken uses the cassava scraping that stands out as an important source of energy, essential component of the rations for chicken cutting. However, it presents unsatisfactory levels of protein and other fundamental minerals in the diet of chickens (FERREIRA, 2010). Still according to the aforementioned author, Cassava is a highly resilient plant and adapted to various climates and soils, which gives it high productivity, and it cheapens costs and makes the product more accessible to farmer.

For its extensive adaptation in the various regions of Brazil, Ferreira et al. (2012), cites that the Northeast region stands out for high productive indices, besides the high nutritional value it presents. The author also describes that the scraping of the cassava root when compared with maize, the main component of the broiler feed rations, has higher nutritional levels, except in the protein requirement.

Cassava presents classification as Mansa or Brava, depending on the hydrocyanic acid content (HCN). The Mansa or also called sweet cassava contains quantities less than 10 mg/kg of glycoside cyanogen in Natura, already the cassava Brava contains values above 20 mg/kg, which gives it often the name of poisonous cassava or bitter. This substance in high quantities causes intoxication in the organism of the animal, thus becoming an anti-nutritional factor. However if well managed and prepared, such substances are eliminated from the food, among the processes that help are the washing, sun exposure and drying (FERREIRA, 2010).

By replacing the maize with manioc shaving in the feeding of broilers in the fattening phase and the final phase, birth et al. (2004) Using concentrations of: 0.0% 5.0% 10, 0%,15, 0% and 25.0%, observed that the levels of cassava scraps recommended for The fattening phase. They determined the percentage of 10.24% of cassava scraps in lieu of maize, without occasioning damage to the performance of the animals. For the final phase, the authors do not recommend the use of the by-product for the broiler rations, because according to them, decreases in weight gain and decreases the food conversion of chickens.

With regard to the production performance of chickens in the period of 1 to 42 days of age, with the inclusion of the integral cassava scraps in the proportions: 0.0%, 5.0%, 10.0%, 15.0% and 20.0%. Ferreira et al. (2012) did not observe significant increase in weight gain, not being viable for the creation of broiler chickens in the period of one to 42 days for the weight gain requirement. However, the proportion of the total cassava scrap significantly affected food conversion and feed consumption indices. It recommends the use of up to 6.77% of full cassava scraps, without damaging the development and carcass of the shaving chicks in the period from one to 42 days.

Cassava Bran enriched with 2% yeast and soy oil (1%) can be used to substitute maize on diets for redneck (female and male) poultry, up to 71% in substitution, without causing harm to the performance of birds (SANTOS and GRANJEIRO, 2012).

In another survey conducted by Ferreira; Lopes e Abreu (2010) with the use of integral cassava scraps for broilers at 1 to 21 days of age, with levels of inclusion: 0.0%, 5.0%, 10.0%, 15.0% and 20.0%, concluded that up to 4.90% of full cassava scrap can be included in the chicken diet , which assists in the productive efficiency index.

Use of yeast

Yeasts are living organisms (fungi) of simple cellular constitution that multiply quickly. which can be beneficial and rarely harmful to man, being widely used by man in various processes, among them the fermentation of products, for example the alcoholic fermentation used for the production of beer and other beverages Alcohol (SOUZA, et al., 2011). Still according to the author, yeasts are aerobic organisms and some species are optional anaerobics, that is, whether or not they depend on oxygen for their survival and use as a source of carbon survival, mainly through glucose, sucrose and fructose.

Yeast-enriched foods have high protein value and high presence of amino acids, contributing to various metabolic processes of birds. According to Silva (2010), the yeast extract promotes desirable performance and proper functioning of the intestinal mucosa, and consequently in the absorption of nutrients, this due to the extract of yeasts contain free amino acids that participate in the division and Cellular growth in the immune system, assisting in the maintenance of the health of the animal.

According to the Barbalho (2009), the yeasts are sources of proteins and have in their constitution, in addition to the high protein level about 20% to 40% of carbohydrates. Such carbohydrates, mostly, are part of the cell wall, which is composed of Glucans and Mananas, which has great direct influence on the immune system. Therefore, due to the advantages in the growth, the development of the birds, and the reduction of the slaughter time, the yeasts have been used and tested in the scientific world.

The yeasts are usually low-cost, due to being by-products or even waste industrial processes, as the example of the alcohol industry (FREITAS, et al., 2013). Among the yeasts used in the poultry feed formulations, Saccharomyces cerevisiae, also known as sugar cane yeast, stands out (SOUZA, et al., 2011).
In studies using the inclusion of NuPro ® yeast to 2% in the diet (ration) of 810 chickens. Evaluating the performance and casting characteristics in the face of yeast diets, the authors observed that diets did not influence statistically on housing characteristics and improved performance with the supply of yeasts in phases 1 to 7 Days of age and from 38 to 42 days of age of chickens.

Another similar study, using 576 chickens, Barbalho (2009), evaluated the inclusion of 0, 2, 4, 6, 8 and 10 kg of hydrolyzed yeast per ton of ration, on mortality data, weight gain and carcass yield of broilers. With regard to the mortality of chickens and carcass yield, the data did not present statistical differences between the treatments, however with the use of 1% of yeast in the phase of 1 to 14 days of life, the chickens showed greater development and at 42 Days higher body weight.

Silva (2010) in his experiment determined the digestibility of the yeast extract and its composition. They concluded that the yeast extract presents 92.49% dry matter, 48.07% crude protein, 4,883 Kcal/kg of gross energy, and presents, on average, a true digestibility coefficient of amino acids of 99.42%, being rich in glutamic acid, leucine, Aspartic acid, Serine, glycine.

Comparing different types of yeasts in the feeding of Broilers, Valadares (2012), evaluated average data of weight gain, feed consumption, food conversion, carcass yield, breast and legs in birds in the period from one to 42 days. For the experiment, the author used 1080 broilers with the level of inclusion of auto smoothed and hydrolyzed yeasts of 10 kg/ton of rations in the period of 1 to 14 days of chicken life. For the period of 15 to 42 days of life were included the level of yeasts and full of five kg/ton of feed. In the first case, the hydrolyzed yeast presented better viability of use, while the yeast was more viable for the second occasion.

Regarding the replacement of soybean bran with sugar cane yeast, Freitas et al., (2013) evaluated the effects of the replacement on 325 chickens. The concentrations used were 0.0%, 5.0%, 10.0%, 15.0%, and 20.0% of yeast in replacement of soybean bran. The use of up to 20% of yeast did not significantly damage performance in the different stages of creation and did not alter the housing characteristics in relation to the control. By the economic study, the substitution proved viable up to the level of up to 20%.

Sorghum

Sorghum is a plant of African origin, of the same botanical family of maize, stands out mainly in the semi-arid and tropical regions, presenting greater yield and better supply of nutrients per unit of area. Its production, not only in Brazil, but throughout North America, South America, Europe and Australia are mainly destined to animal feed, whereas in other countries such as Africa, Russia and China and other Central American countries, the sorghum grain is Important food of basic human consumption. Sorghum has been used in some countries as fodder plant (IPA, 2014).

In addition, its nutritional value can correspond to up to 95% compared with maize, with the cost differential at up to 88% lower. It is a promising source of energy in substitution for maize in use for the manufacture of non-ruminant feed. Having nutritional characteristics similar to those of maize, it presents the advantage of having a richer protein value. However, the corn still stands out because it contains a greater amount of ethereal extract and essential amino acids compared to sorghum (WHITAKER & CARVALHO, 1997).

Sorghum, still compared with maize, has low xanthophyll and carotene content, substances that are responsible for yellowish or orange pigmentation in egg yolk or chicken skin, although it does not have a nutritional significance, it is an Important feature defined by consumer preference. However, sorghum has advantages over the smallest degree of humidity of its grains, similar nutrient values and lower production cost when compared to maize (VASCONCELOS, 1988; ZARDO & LIMA, 1999).

Daily consumption of rations based on sorghum only in the pre-initial phase (1 to 7 days) was less feasible due to the low levels of amino acids of sorghum, not meeting the nutritional requirements of broilers at this stage. Other authors report that sorghum in the initial phase may influence negatively due to its tannin content. Analyzing food conversion, chickens fed on diets based on 100% sorghum, had food conversion greater than other foods.

The use of sorghum in total replacement for maize, performing it from the eighth day of age, not interfering negatively on the performance data and carcass yield. The addition of up to 7.5% of amino acids in sorghum-based rations enables the production of carcasses with yields similar to those fed with maize and soy bean rations, however, does not provide a significant increase in the coloration of the carcass, Which is dependent on the use of pigments in the feed. (ROCHA, 2008).

Conclusion

The choice or determination whether it is feasible to use alternative foods, or even which food to use, should be based mainly on the availability of the food in the region in which it is located, providing greater or lesser cost. It is also dependent on the choice of food from its nutritional capacity and digestibility, generating direct results on animal performance and consequently on the final performance of the activity.

The digestibility of most alternative foods is low, which can interfere with food conversion, decreasing animal performance. This way recommends alternative foods for broilers in proportions of up to 20% in the fattening/termination phase, and in low proportions for the initial phase, highly digestive foods being required at this stage.

In general, alternative foods are excellent alternative to the use in broiler diets. Studies related to alternative food for broilers are fundamental and contribute to the development of significant advances in this activity.

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