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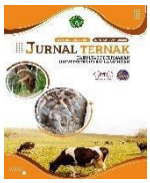

Evaluation Of Commercial Feed Replacement With Beer Desserts And Ingredients Feed Fermented To Quality And Quantity Of Male Laying Chicken Meat

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ABSTRACT

Male laying chickens need careful consideration of feed factors so that profits can be maximized, therefore we need to create feed that is quite economical. Therefore, this research uses beer dregs which are nutritionally high in protein and relatively cheap in price. The fermentation process in beer making increases the protein content in beer dregs, and the availability of amino acids that are easily digested . The material used in this research was male laying hens of the finisher period (40 days to 60 days old). The experimental method used a Completely Randomized Design (CRD) with 4 treatments and 4 replications, each replication consisting of 4 chickens and the total sample used was 64 male laying hens in the finisher period. The treatment given is P1 = 100% commercial feed, P2 = 90% commercial feed + 10% ABJF + IT, P3 = 80% commercial feed + 20% ABJF + TI, P4 = 70% commercial feed + 30% ABJF + IT. The results of the study showed that the replacement of feed with beer dregs and fermented corn (ABJF) + fish meal (TI) had a very significant effect (P<0.01) on the tenderness of the meat of laying roosters, but did not show a real effect (P>0.05). on the increase in carcass percentage, abdominal fat, and meat pH value. The results of research on replacing commercial feed with ABJF + IT in laying roosters in the finishing period can increase meat tenderness as seen from the high results of the meat tenderness test. With the highest meat tenderness value, P3 was obtained with a feed substitution concentration of ABJF + TI of 30%. However, it had no effect on carcass percentage, abdominal fat, and meat pH value. Suggestions from this research include replacement of substitute feed (ABJF) + IT which can be used up to 30% levels. And further in-vivo research can be carried out on the use of ABJF + TI substitute feed with levels above 30%.

Introduction

Male laying hens are discarded chickens or waste from sorting DOC (Day Old Chicken) production results. Laying hens. Initially, laying hens are hatched and become Day-Old Chickens (DOCs). DOCs are newly hatched, one-day-old chicks. These day-old DOCs are then

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sorted and separated into female laying hens and male hens, also known as broiler chickens. In the past, male hens were considered culls and were destined for destruction , as they were not bred for breeding.

Egg-laying rooster farming requires careful consideration of feed factors to maximize profits. Therefore, we need to create a feed mix at a fairly affordable price . That need material manufacturing feed Which more minimalis in condition Which Now with increase The price of feed continues to rise, so we have to overcome this by making our own feed mixture for chickens, where the price of feed continues to be expensive, so we have to be smart in utilizing it. waste For in make it feed like dregs beer Which own economical low However has a fairly high protein content, this opinion is in accordance with the opinion of (Nugroho 2021). The opinion above states that giving mixture feed fermented Which made can expenditure on time now where the price of feed is continuously rising.

Beer dregs are a byproduct of the beer-making process. This material is the solid residue left after the fermentation process in beer production. Beer dregs contain nutrients such as fiber, protein, and a small amount of alcohol. As an alternative feed for poultry, beer dregs can be utilized because of their nutritional content, which can provide several benefits, such as protein and fiber. One of the main benefits of fermenting beer dregs and corn is improving the nutritional quality of feed ingredients. Fermentation can reduce anti- nutrients such as phytate and lignin and increase the availability of nutrients such as protein and amino acids. Fermented feeds such as fermented corn or fermented fish meal can be a good alternative for poultry feed. Fermentation is a process in which microorganisms such as bacteria, yeast, or fungi are used to break down substances in feed ingredients, thereby increasing nutrient availability and improving digestibility for poultry. And some of the benefits of fermented feed as a poultry feed ingredient that is like, improvement availability nutrition, Increase digestibility, And increase quality and quantity in livestock

State of the Art

Research on the use of alternative feed ingredients based on agro-industrial waste has grown rapidly in line with the rising cost of commercial feed, which accounts for more than 60% of total poultry production costs. Beer dregs, a byproduct of the fermentation industry, have long been known to contain protein and fiber that have the potential to be used as a poultry feed ingredient, but limited digestibility and antinutrient content are major obstacles to its direct use. Several previous studies have shown that fermentation of feed ingredients

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using microorganisms such as *Aspergillus niger* can increase nutritional value, reduce crude fiber, and increase the availability of amino acids and metabolizable energy. However, most previous research has focused on broiler chickens , with the main parameters being body weight gain, feed conversion, and economic efficiency. Studies on male laying hens , particularly in the finisher phase, are still relatively limited and are often positioned as a secondary object in poultry research.

The novelty of this research lies in the integrative approach between commercial feed substitution, the fermentation process of local feed ingredients, and the evaluation of the meat quality of male laying hens. This study not only assessed quantitative aspects such as carcass percentage and abdominal fat, but also focused on meat quality parameters , namely meat pH and tenderness, which are rarely the main focus in studies of alternative waste-based feeds. The results showed that replacing commercial feed with ABJF + fish meal up to 30% did not reduce carcass percentage, abdominal fat, or meat pH values, but significantly increased meat tenderness ($P < 0.01$). This finding strengthens the assumption that fermentation not only functions to increase the nutritional value of feed, but also has direct implications for the physical characteristics of meat through the mechanism of increasing organic acids and changes in muscle protein structure.

Thus, this research's position in the scientific landscape (state of the art) is as a bridge between research on alternative feed based on fermented waste and studies on the meat quality of male laying hens , which have so far received little attention. This research expands the scope of poultry studies from simply production efficiency to optimizing the added value of livestock products , while also supporting the concept of sustainable livestock farming and a circular economy based on the utilization of industrial waste.

Method

Material Which used in study This is 64 tail chicken egg layers male aged 40 day or finisher phase. The feed ingredients used are commercial feed, beer dregs, fermented corn and fish meal. The composition of the treatment feed used is, P0 = 100% Commercial feed, P1 = 90% Commercial feed plus 10% (ABJF) beer lees, fermented corn + (TI) flour fish, P2 = 80% Feed commercial plus 20% (ABJF) dregs beer, corn fermented + (IT) flour fish, P3 = 70% Feed commercial plus 30 (ABJF) beer dregs, fermented corn + (TI) fish meal. This research used an experimental method with a completely randomized design, and compared the final results regarding carcass percentage, abdominal fat, meat pH, and meat tenderness when fed. dregs

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mixture beer And material feed fermented with 4 times test and each of them test given 4 chickens. The following table shows the results of the proximate analysis of the content Nutritional content of raw feed ingredients :

Table 1. Results analysis proximate content nutrition material standard feed .

Substance Food	ABJ (%)	ABJF (%)	TI (%)	ABJF + IT (%)
Energy Metabolism	2730.10	2929.41	2750	2921
PK	12.37	12.53	41.6	14.62
LK	3.31	3.35	7.82	3.66
SK	5.23	5.06	0.91	4.96
BK	58.30	57.41	85.90	58.83
Ash	1.30	1.74	3.45	2.98

Based on results analysis content nutrients in Laboratory Nutrition And Animal Feed Faculty of Animal Husbandry, Brawijaya University

Information :

ABJ : Dregs beer And corn
ABJF : Dregs beer And corn TI fermentation:
Fish Meal

This study used substitute feed consisting of 47.5% beer dregs, 47.5% corn, and 5% flour. fish in 100% feed complete. As for distribution formulation based on treatment on study This is in Table 2. Formulation of treatment feed ingredients in 100% complete feed.

Table 2. Formulation material feed treatment in 100% feed complete

Material Feed(%)	P0 (Control)	P1 (10%)	P2 (20%)	P3 (30%)
Dregs Beer (47.5)	0	4.75	9.5	14.25
Corn (47.5)	0	4.75	9.5	14.25
Flour Fish (5)	0	0.5	1	5
Feed Commercial	100	90	80	70
Total	100	100	100	100

Treatment Group (Mixture of Beer Dregs, Corn, and Fish Meal) Male laying hens in the treatment group will be fed a mixture of beer dregs and corn in specific percentages, plus fish meal. This feed mixture will be designed to partially replace commercial feed. Control Group (Commercial Feed) Male laying hens in the control group will be fed commercial feed available in the market. This will be a control group representing conventional husbandry practices. Table 3. Nutritional values of feed in each treatment. The following table shows the nutritional values of feed in each treatment:

Table 3. Mark nutrition feed on each treatment

Substance Food	P0	P1	P2	P3

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Energy Metabolic	2750	2767.94	2785.88	2803.82
PK	19.00	19.37	19.79	19.99
SK	5	4.95	4.90	4.85
LK	4	4.29	4.58	4.87
BK	83.30	83.85	84.40	84.95
Price	7,600	7,293	6,983	6,680

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Variables or Parameter observed

Variables Which observed on cattle after process replacement feed kormesil with dregs beer and fermented feed ingredients, namely quality and quantity which include:

a. Percentage Carcass
b. Fat Abdominal
c. Mark Meat pH
d. Tenderness Meat

Procedure Feed Manufacturing Research

a) Mixing Dregs beer And corn Then in fermentation during most A little 3 day.
b) Mix flour fish 5% And corn 47.5 % Dregs beer 47.5%.
c) After Dregs beer And corn fermented the Already in mix with flour fish homogeneously and then mixed with commercial feed with the percentage used

Making Pen

a) Prepare partition For placement every unit test as much as 16 plot with size 50 cm 200 cm. The cage specifications are a raised and open *house cage,* with a width of 50 cm. 200 cm long height 200 cm 1 m wall, roof model covered with wood, base or floor made of wire ram.
b) Prepare the tools and materials that will be used to disinfect the cage and the tools used.
c) Putting 4 place Eat Which made from pipe Which in split, And place 4 drink Also from split pipe.

Determination Sample

Determination of male laying hen samples is done by taking male laying hens with the strain, age and pen which the same then weigh weight beginning laying hens male which done at the age day to 40 morning before given feed. Weight body chosen from flat - flat with level diversity < 10%, After in weigh, then the chicken egg layers male starts placed pen Which

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Dyah Eka Wahyuni, et. al./ Animal Husbandry Journal 16 (2) 2025 pp. 277-289
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Already provided For The research was conducted randomly according to the research plan.

Procedure Retrieval Data

Quality And Quantity Meat Chicken Egg layer Male

a) Percentage Carcass

Retrieval data weight carcass done with method weigh chicken after slaughtered, blood, feathers on the head, neck, lower legs and stomach contents are removed, the percentage of carcass is calculated by dividing the carcass weight by the live weight of the chicken and multiplying it by 100%, using the formula:

$$\text{Percentage Carcass} = \frac{\text{Weight Carcass (gr)}}{\text{Weight Life (gr)}} \times 100\%$$

b) Fat Abdominal

Abdominal fat is a layer of fat found around the gizzard and the layer between the abdominal muscles and intestines (Salam, Sunarti, and Isroli 2013). Determining the percentage of abdominal fat can be calculated by dividing the weight of the abdominal fat by the live weight, multiplied by 100 percent (Waskito 1981) using the formula:

$$\text{Fat Abdominal} = \frac{\text{Weight Fat Abdominal (gr)}}{\text{Weight Life (gr)}} \times 100\%$$

c) Meat pH

The pH value was measured by taking 10 grams of sample from each experimental unit for each treatment (Rizaldy, Dinasari, and Puspitarini, 2021). Chicken meat ground use mortar And placed in receptacle sterile Then added with 10 ml distilled water Then homogenized. Sample Which has homogeneous measured pH his with pH meters which has been calibrated with a pH buffer solution of 4.0 and 7.0, then wait until the pH of the meat is constant.

d) Tenderness Meat

One of the assessments of meat quality is its tenderness which is influenced by many factors. Factors that influence meat tenderness are related to the composition of the meat itself, namely in the form of weave binder, fiber meat, seI-seI Fat Which There is between fiber meat as well as rigor mortis meat Which happen after cattle cut Tenderness meat can known with measuring power break up, the more low value Power break up, the more soft meat the (Tambunan, 2010). Testing tenderness done use tool penetrometer (Mucthadi And Sugiyono, 1992). Tenderness results are calculated

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using the formula:

$$\text{Tenderness (mm/gr/10 second)} = \frac{\text{Total Measurement}}{\text{10 seconds}}$$

Analysis Data

Data study analyzed variety based on Design Random Complete (RAL) If there is a difference Which real or very real so to be continued with the smallest real difference (LSD).

Results and Discussion

Analysis Percentage Kaskar

Based on analysis variety show that level use Dregs beer And corn Fermented fish meal (ABJF) + fish meal (TI) as a substitute for commercial feed had no significant effect (P>0.05) on carcass percentage. The average carcass percentage values can be seen in Table 3.

Table 4. Average influence replacement feed commercial with ABJF+TI to percentage carcass

Treatment	Mean±SD
P0	53.5±2.34
P1	52.9±1.24
P2	53.8±0.14
P3	55.075±3.54

The replacement of beer dregs, fermented corn (ABJF) + fish meal (TI) up to 30% has no difference with ordinary commercial feed even though Table 4 shows balanced energy and protein nutritional values. This is in accordance with Rohmah's research (2024) The percentage of carcass that has no effect can be caused by the treatment ration containing almost the same nutrients, more specifically protein which plays a role in body tissue formation substances so that it can be concluded that beer dregs, fermented corn (ABJF) + fish meal (TI) can replace commercial feed up to 30%.

And in the research of Firmansyah, (2024) analyzed the increase in body weight where the replacement of commercial feed with beer dregs, fermented corn (ABJF) + fish meal (TI) up to 30% had an effect on the increase in body weight. This increase in body weight was apparently from the results obtained in comparison with the results of abdominal fat, this increase in body weight led to the formation of abdominal fat in P1 so that the percentage of carcass in P1 decreased. Based on the results of the study Which obtained agree with Wahju (2004) If energy

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in feed Which consumed not enough from the needs, then feed consumption will be high, whereas if energy needs exceed needs, then consumption will be high. feed will low. When need energy chicken fulfilled in rations so on generally chickens will stop consuming feed.

In terms of figures, the increase in carcass percentage in P2 and P3 was followed by a decrease in abdominal fat. This proves that the tendency to increase carcass percentage is very closely related to fat abdominal Which Where on study This leak abdominal show trend decreased. Therefore, weight gain with increased replacement of beer dregs, fermented corn (ABJF) + fish meal (TI) is more directed towards carcass formation than abdominal fat.

Results analysis percentage carcass Which there is on picture 2 Which show improvement Which The differences were not significant in each treatment, although P0 showed a higher monetary value compared to P1. P3 had the highest carcass percentage numerically. The increasing replacement of commercial feed with beer dregs, fermented corn (ABJF) and fish meal (TI) showed an increase in energy and protein values. Therefore, the carcass percentage increased numerically, even though even No influence percentage carcass. According to study Haryoko et al. (2012) improvement the proportion of protein in rations can reduce fat accumulation in the body This contributes to improved meat quality and reduced abdominal fat.

The role of beer dregs and fish meal as sources of animal and vegetable protein and corn as a source of energy as well as *Aspergillus* deep *niger* fermentation material feed that is dregs beer And corn Also influential in the nutritional quality of feed given to laying hens. Because *Aspergillus niger* can increase availability nutrition like protein, sour organic, And amylase enzyme, protease, And sesulase which helps in the process of digestion and decomposition of feed components.

Analysis Fat Abdominal

Based on analysis variety show that level use Dregs beer And corn fermented (ABJF) + flour fish (IT) as replacement feed commercial No influential significant (P>0.05) against abdominal fat. The average abdominal fat value can be seen in Table 4.

Table 5. Average influence replacement feed commercial with ABJF+TI to fat abdominal

Treatment	Mean±SD
P0	0.2100±0.031
P1	0.2133±0.011

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P2	0.2100±0.017
P3	0.2067±0.030

Matter this is because of the composition from dregs beer, corn fermented + flour fish can replace its equivalent value with feed commercial Which Where on study This using replacement feed commercial with beer dregs, fermented corn + fish meal up to 30%, which means the effect of up to 30% replacement of beer dregs, fermented corn + fish meal can replace commercial feed. So if the composition replacement feed koemrsil with dregs beer, corn fermented + flour fish more low then it will not be able to replace commercial feed. According to research by Ramadhani et al. (2022), they added bio enzyme And ginger on feed commercial chicken broiler period finisher show results which had no significant effect on abdominal fat. Therefore, it can be concluded that adding or replacing feed containing bioenzymes such as amylase or cellulase can affect fat metabolism and digestion. In this study, the replacement feed was fermented using *Aspergillus niger,* which produces cellulase enzymes.

The average abdominal fat percentage analysis results in Table 4 show that there is no significant effect (P>0.05) on abdominal fat. Although statistically, there is no significant effect. on picture 3 in a way number average percentage fat abdominal on study This show P1 By replacing commercial feed with beer dregs, fermented corn (ABJF) + fish meal (TI) 10% has a higher tendency compared to P0. This is because this occurs due to the feed ingredients used in study treatment own intake energy Which increase. Use energy Which The higher the energy, the higher the metabolic energy in the treatment. This is because after energy is used for basic life and production, the remainder is stored as abdominal fat. Therefore, the percentage of abdominal fat in P1 tends to increase numerically, but there is no significant difference. real. According to Leeson And Summer, (2005) nutrition Which No fully utilized For growth or tissue synthesis can be stored in the form of fat, especially in abdominal fat. Increased fat content energy in feed Which balanced with activity physique or growth network often time will be stored as body fat including in the abdomen.

But in P2 and P3 with the replacement of commercial feed with beer dregs, fermented corn (ABJF) + TI fish meal 20% and 30% Numerically, there is a downward trend. This may be due to the potential effects of ABJF + TI, which has nutritional value that can increase metabolism or influence the fat storage process. The fermentation process using *Aspergillus niger* , which can produce the amylase enzyme, can affect the digestion process or fat metabolism.

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In addition, as with the role of *Aspergillus niger mold* as a fermentation agent in substitute feed, this research also resulted in a binding agent for nutritional quality in feed. This binding is due to the presence of enzyme amylase which produced by *Aspergillus Nigeria* . Role enzyme amylase on body cattle poultry is to help digest food so that chicken can get energy Which more Lots for increasing its productivity. This is agreed by Palgunadi *et al* ., (2021) Enzymes play a very important role in the process of food digestion and metabolism of food substances in the body.

Value Analysis Meat pH

Based on the analysis of variance, it shows that the level of use of beer dregs and fermented corn (ABJF) + flour fish (IT) as replacement feed commercial No influential real (P>0.05) on the pH value of meat. The average pH value of meat can be seen in Table 5.

Table 6. Average influence replacement feed commercial with ABJF+TI to mark pH meat

Treatment	Mean±SD
P0	5.755±0.445
P1	5.73±0.454
P2	5.7175±0.509
P3	5.6925±0.381

This is due to the replacement of commercial feed with beer dregs, fermented corn (ABFJ) + (TI) which has a nutritional content of protein, fiber and natural probiotics from the fermentation process. So that the fermentation process by Aspergillus nigger which can produce organic acids, with an increase in the proportion of replacing commercial feed with beer dregs, fermented corn (ABJF) + fish meal (TI), the organic acid content increases, as the results of this study show that the pH value of the meat decreases numerically even though it does not have a significant effect. So from this it can be seen that in replacement dregs beer, corn fermented (ABJF) + flour fish (IT) more Good Because on research this gives trend mark pH Which the more decrease so that quality the meat can more Good. Matter This in supported by research by Sutrisno *et al* . (2013) the use of citric acid in feed can increase digestive efficiency, as well as support muscle growth and meat formation.

If seen in a way number there is decrease in treatment replacement feed commercial with ABJF + IT. So matter This can conclude that on replacement feed commercial with ABJF + IT make The pH value of meat tends to be lower, although there is no significant difference. Therefore,

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the lower pH is related to the presence of microbial growth in the meat. The pH of meat after slaughter changes from normal (7.0) to (5.4-5.8) due to the production of acid. lactate in muscle. At lower pH values (around 5.6) the growth of these microbes can be inhibited because the environment becomes too acidic for most pathogenic microbes so that the quality of the meat of male laying hens that have been given ABJF + TI substitute feed causes it to not spoil easily after slaughter. This is supported by (Lubis, Irfan, and Haq, 2020) Biological damage to chicken meat is the presence of microbial growth originating from livestock, the slaughter process, and marketing.

Based on the average in table 5 It can be seen that the average pH value of meat in this study ranged from 5.69 to 5.75. In this study, replacing fermented corn beer amaps and corn with substitute feed did not have a significant effect. real. Value pH the classified as on mark pH Which normal. Value pH meat normal is 5.4 to 5.8. For comparison, Prayetno's (2012) study, which provided a commercial ration with 22% protein content to broiler chickens, produced an average pH value of 5.56. This study also observed meat tenderness, where a lower pH affects the softening process and muscle fiber structure, where a lower pH can increase meat tenderness. When the pH drops to 5.4–5.6, muscle proteins undergo structural changes, including protein denaturation, which helps break down muscle tissue into a more tender texture.

Analysis Tenderness Meat

Based on analysis variety show that level use Dregs beer And corn fermented fish meal (ABJF) + fish meal (TI) as a substitute for commercial feed had a significant effect (P<0.01) on meat tenderness. The average meat tenderness values can be seen in Table 6.

Table 7. Average influence replacement feed commercial with ABJF+TI to tenderness meat

Treatment	Mean±SD
P0	2.5175 ^{a} ±0.323
P1	3.315 ^{a} ±0.632
P2	4.5975 ^{b} ±0.344
P3	4.85 ^{b} ±0.257

Information, letter Which different on column Which The same show difference very real.

This is due to the use of different or increasing substitute feed replacements of beer dregs and fermented corn (ABJF) + fish meal (TI) in each treatment causing chicken breast meat male egg

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layers the more soft. And Because content nutrition feed Which own role important Also can have an impact to improve it tenderness meat like protein Which can help forming a network muscle Which more Good as well as contribute in improvement mark tenderness meat. According to Mahfudz et al. (2009) beer dregs can be used in rations up to 15% still has an impact on meat quality.

Table 6 shows that the average value for each treatment increases in line with the increasing increasing formulation replacement feed substitution dregs beer, corn fermented (ABJF) And fish meal. Based on ANOVA analysis, the highest average value for meat tenderness was found in P3 with a value of 4.85. Average lowest there is on P0 (control) with mark 2.51. So matter This show that from There is his The fermentation process results in an increase in micro minerals, not only enriching the nutritional composition of the meat with protein but Also increase level fat Which make meat the more soft. So In this study, replacing commercial feed with ABJF + TI up to 30% can affect the quality of chicken meat. Male laying eggs means meat tenderness so that the ABJF replacement feed formulation is increasing + IT so become the more soft.

Results highest there is on treatment P3 with concentration giving feed substitution dregs beer and fermented corn (ABJF) + 30% fish meal affected the tenderness of laying hens during the finishing period. This indicates that replacing commercial feed with beer dregs an corn infected by *Aspergillus Nigeria* This produce feed Which sour organic more tall with feed commercial normal. Matter This in agree by Soeparno (2005) that improvement level sour organic will followed by an increase in the loss of physical attachment of muscle fibers which is followed by an increase in the yield of soluble protein, so that the power required to cut the meat will be reduced.

Conclusions

Based on the research results, replacing commercial feed with fermented beer dregs and corn (ABJF) + fish meal (TI) in finishing period laying hens can increase meat tenderness as seen from the high results of the meat tenderness test. With the results of the highest meat tenderness value obtained. P3 with concentration replacement feed substitution dregs beer an corn fermented (ABJF) + fish meal 30%. However, it does not affect the percentage of carcass, abdominal fat, and pH value of the meat.

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