Role of Pelleted Fermented Feed-in Improving Semen Quality of Cocks

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Abstract

The local probiotic (Iraqi probiotic)containing *Lactobacilli, Bifid bacterium, Bacillus subtilis*, and *Saccharomyces cerevisiae* was used to ferment feed (FF) aerobically for 48 hours, after which dried and pelleted by pelleting machine in Al-Baraka grinder/ Babel government, 30 roosters were used in study fed on fermented feed with different level in poultry farm/ agriculture college/ Al-Qasim green university. The cocks were divided into 5 treatments T1, T2, T3, T4, T5 fed on F.F. (0, 25, 50, 75, and 100%), respectively, some qualitative characteristics of semen were measured, and the experiment continued for 20 weeks. It was found that there was a highly significant (P≤0.01) superiority in the total average ejection volume for treatment T5 and all fermented feed treatments in mass motility and individual motility of sperms and sperm concentration, as well as a highly significant improvement (P≤0.01) for all treatments of fermented feed in the percentage of dead sperm.

Keywords: cock, probiotic, fermentation, semen quality.

Introduction

The increase in the production of poultry (meat and eggs) depends on the fertility of the layer and broiler breeder. It is clear that the fertility of poultry is related to the fertility of both males and females, but the decrease in the number of males used in natural or artificial insemination gives it more economic importance in the poultry industry (Kamali et al., 2017), enhancing semen volume, sperm concentration, viability, motility, and polyunsaturated fatty acids in sperm, as well as protection from oxidative damage, can improve sperm membrane function, Mitochondrial activity, sperm penetration into the egg, and thus fertility (Fouad et al., 2020). Inbreeding flocks of different bird species, the male is responsible for producing a large number of fertilized eggs, which can exceed more than 1000 fertilized eggs annually in some species such as chickens (Lagares et al., 2017: Wu et al., 2017), semen characteristics including volume, sperm concentration (total number); live sperm count, dead sperm, abnormal sperm; The forward movement is generally tested to assess and predict male fertility in poultry (Chen et al., 2016: Sun et al., 2019), and there is a significant role for F.F. with probiotic and converted into a pellet in improving the productive traits of chickens (Al-Jebory and Naji, 2021 a and b). Therefore, this study aims demonstration of the effect of aerobic fermentation of feed with the probiotic and its conversion into pellets to take

advantage of the physical changes in the feed and studying the effect of substituting aerobic and pelleted it on the qualitative characteristics of rooster semen.

Materials and Methods

The experiment was conducted in the poultry farm of the College of Agriculture / Al-Qasim Green University for 20 weeks, extending from 10/28/2020 to 10/3/2021, where 35-week-old roosters of Mizo chickens were used. The rooster was divided into 5 treatments, each treatment was 6 roosters, divided into 3 replicates, each replicated 2 cock, for five periods, each period of 2 weeks. The treatments of the experiment were as follows (T1: control treatment, T2: FF at a rate of 25%, T3: FF at a rate of 50%, T4: FF at a rate of 75%, T5: FF at a rate of 100%)

Probiotics and F.F. Preparation: A commercial Iraqi probiotic content *(lactobacilli, Bacillus subtills, Bifidobacterium, Saccharomyces cerevisiae)* used to ferment diet in table 1, aerobically fermentation with 10 g of a probiotic / kg of feed and a wetting ratio of half a liter of water/kg of feed for 48 hours after that the FF was dried and pelleted by pelleting machine.

Feed treatment

The chickens were fed on ration (Table 1), a feed ration of 104 gm/cock/day.

Table (1):The diet components in the study and their chemical composition

Ingredients	%
yellow corn	**37**
wheat	**14**
barley	**16.2**
Soybean meal	**15**
Wheat bran	**11.8**
*Premix	**2**
DCP Calcium Diphosphate	**3**
Sunflower oil	**1**
Total**	**100%**
Metabolic energy (kilocalories/kg feed)	**2771.44**
Crude protein (%)	**15.88**
Crud fiber	**5**
Calcium (%)	**1.25**
Available phosphorus (%)	**0.74**
Methionine + cysteine (%)	**0.64**
Lysine (%)	**0.73**

*Premix Maxcare of Belgian origin Each 1 kg contains: crude protein 7.9%, lysine 2.4%, methionine 7.7%, methionine + cysteine (7.7%), calcium 23.1%, phosphorous 3.3%, sodium 5.5%, representative energy (2903 kcal/kg), vitamin A (400,000 IU), Vitamin D3 (300,000 IU), Vitamin D (20,000 IU), Vitamin E (800 IU), Vitamin K 80 ppm, Vitamin B1 40 ppm, Vitamin B2 (1600) ppm, Calcium Pantothenate (320) ppm, Niacin (600) ppm, Biotin (1600) ppb, vitamin B12(1000) ppb, folic acid (40) ppm, vitamin B6 (160) ppm, iron 2800 ppm, copper 600 ppm, zinc (2400) ppm, magnesium (4000) ppm, iodine (80) ppm, selenium 8 ppm.

** Chemical analysis computed according to NRC (1994)

• Dicalcium phosphate with a concentration of calcium in 24%, phosphorus 18%.

• (9000) kcal/kg oil.

Studied traits

semen collection

Semen collection by following the dorsal abdominal massage method for roosters, three times from each rooster per week, according to the method between them (Al-Daraji, 2013), The second person massages the ventral dorsal region (starting from the back of the rooster and ending at the base of

the tail), where 1.5 ml tubes were used for collection and were then placed in an incubator at a temperature of 37 °C, and the examinations were conducted after that using a microscope.

Ejaculated volume

A 1.5 mL microtube was used for ejection volume measurement.

Mass motility

One drop of semen is placed on a glass slide, and the collective motility of the sperm (%) is estimated using an optical microscope lens, with a magnification of 10×. According to the rating scale listed below, according to Al-Daraji (2007).

Individual motility

A drop of semen is placed on a glass slide and mixed with three drops of 2.9% sodium citrate solution. A slide cover is placed over the mixture, and the individual movement is estimated using an optical microscope lens with a magnification power of 40×, and the movement is read in 3-4 microscopic fields, according to what Al-Daraji (2007).

Sperm concentration

A hemocytometer was used to measure the concentration of semen, and a method was applied (Al-Daraji, 2007).

Dead sperm

One drop of semen is placed on a glass slide, and one drop of eosin-necrosin dye is mixed with the tip of another glass slide. Then the mixture is gently withdrawn by the second end of the glass slide used for mixing to make a smear of the mixture. The slide is left to dry for one minute and then read according to the method (Lake and Sterwart, 1978).

statistical analysis

The Statistical Analysis System -SAS (2012) was used in data analysis to study the effect of different treatments on the traits studied according to a Completely Randomized Design (C.R.D), and the mean differences among the treatments were compared according to Duncan multiple ranges test (Duncan,1955).

$Yij = \mu + \tau i + \varepsilon ij$

Yij: The observation j of treatment i.

μ: Overall mean.

τi: effect of treatment i (the study included the impact of five treatments).

εij: a random error that is normally distributed with an average of zero and a variation of σ2e

Results

Ejection volume (ml)

Table (2) shows the effect of the studied treatments on the volume of the ejaculate. It is noted that there are no significant differences between the treatments in the first week of the first period, the second week of the second period, the third period and the second week of the fifth period, and in the second week of the first period, they outperformed significantly ($P \leq 0.05$) treatments T2, T3, T4 compared to treatment T1, and there was no significant difference between treatments T3, T4, T5, T2 and also between the treatments T1, T5, but in the second period in the first week, a significant superiority ($P \leq 0.01$) was observed for treatment T5 compared to the treatments T1, T3 and the superiority of treatments T2, T3, T4 over treatment T1, and no significant difference was found between treatments T2, T4, T5, as well as between treatments T2, T3, T4 and in the fourth period, a significant superiority ($P \leq 0.05$) was observed during the first week for treatment T4 compared to treatment. In treatment T2, no significant difference was found between treatments T1, T3, T4, T5 and also between treatments T1, T2, T3, T5, while in the second week of it a significant ($P \leq 0.01$) was obtained for treatment T5 compared to the rest of the treatments and treatment T3 was superior

to treatment T1. There was no significant difference between treatments T1, T2, T4 as well as between treatments T2, T3, T4 and in the first week of the first period. For the fifth, it was found that there was a significant superiority (P≤0.05) for treatments T2, T3, T5 compared to treatment T1, there was no significant difference between treatments T4, T1 and also between treatments T2, T3, T4, T5.

Table (2): Effect of pelleted fermented feed on ejection volume (ml) for cocks.

periods	weeks	Stander error± Average					
		T1	T2	T3	T4	T5	**Significant**
1	1	0.03±0.33	0.03±0.33	0.01±0.36	0.06±0.36	0.08±0.33	**N. S**
	2	0.05±0.30 b	0.05±0.43 a	0.06± 0.46 a	a 0.03± 0.46	0.05±0.40 ab	*
2	1	c 0.03±0.33	0.04±0.56 ab	0.08±0.48 b	ab 0.05±0.50	0.07±0.60 a	**
	2	0.03±0.41	0.07±0.46	0.05±0.46	0.05±0.40	0.01±0.46	**N. S**
3	1	0.05±0.40	0.03±0.41	0.03±0.40	0.03±0.43	0.08±0.43	**N. S**
	2	0.04±0.23	0.06±0.33	0.01±0.26	0.02±0.36	0.03±0.33	**N. S**
4	1	0.01±0.33 ab	0.08±0.20 b	0.05± 0.23 ab	a 0.04± 0.36	0.02±0.30 ab	*
	2	c 0.02±0.26	0.04±0.33 bc	0.09±0.40 b	bc 0.01±0.33	0.05±0.56 a	**
5	1	0.03±0.36 b	0.02±0.53 a	a 0.01±0.56	ab 0.04±0.46	0.01±0.63 a	*
	2	0.05±0.32	0.03±0.43	0.03±0.33	0.03±0.40	0.02±0.46	**N. S**
Average		c 0.01±0.31	0.05±0.40 b	0.09±0.39 b	b 0.05±0.41	0.01±0.45 a	**

Means with different letters indicate a significant difference in probability level 0.05, 0.01 N. S: Not significant. *(P≤0.05), ** (P≤0.01). The treatment T1, T2, T3, T4, T5 are control treatments without addition, adding 25%, 50%,75%, 100% fermented feed, respectively.

mass motility %

It is noted from Table (3) the effect of the study on the collective movement of sperms, as it appears that there are no significant differences between the treatments in the first week of the first and fifth period and the second week of the third period, and it was found in the second week of the first period a significant superiority (P≤0.01) for treatment T4 compared to In the treatments T1, T3, and treatments T2, T3, T5 were superior to treatment T1, there was no significant difference between treatments T2, T4, T5, as well as between treatments T2, T3, T5, but in the first week of the second period, the treatments T4 were significantly superior (P≤0.01) , T3 compared to treatments T1, T5, and treatments T2, T5 were superior to treatment T1, and the table did not show significant differences between treatments T2, T3, T4 and also between treatments T2, T5, while in the second week a significant superiority (P≤0.01) was observed for all F.F. treatments compared to treatments In treatment T1, there was no significant difference between treatments T2, T3, T4, T5, but in the first and second weeks of the third and fifth period, respectively, it was found that there was a significant superiority (P≤0.05) for treatment T5 compared to treatment T1 and there was no significant difference between treatments T2, T3, T4, T5, and also between treatments T1, T2, T3, T4 and in the first week of the fourth period The treatment T3 was significantly superior (P≤0.01) compared to treatments T1, T2, and treatments T1, T4, T5 were superior to treatment T2, and the statistical analysis did not show a significant difference between treatments T3, T4, T5 as well as between treatments T1, T4, T5, while in the second week Significant superiority (P≤0.05)

was obtained for the two treatments T4, T5 compared to the treatments T1, T3, and no significant difference was found between treatments T2, T4, T5 and also between treatments T1, T2, T3, but in the average mass motility it was significantly superior (P≤ 0.01) Treatment T4 compared to treatment T1, T3 and the treatments T2, T5 outperformed treatment T1 and there was no significant difference between treatments T2, T4, T5, and also between treatments T2, T3, T5 as well as between treatments T1, T3.

Table (3): Effect of pelleted fermented feed on mass motility % for cocks.

periods	weeks	Stander error± Average					
		T1	T2	T3	T4	T5	Significant
1	1	0.88±83.67	1.15±86.00	2.50±84.33	1.20±83.67	1.85±83.67	N. S
	2	2.08±81.00 c	1.20±86.66 ab	82.66 b 0.66±	0.35±88.66 a	1.45±85.33 ab	**
2	1	1.15±80.00 c	1.00±86.00 ab	1.85±87.66 a	2.02±88.66 a	1.15±82.00 b	**
	2	1.45±74.66 b	0.66±85.66 a	1.20±86.66 a	0.57±89.00 a	0.88±86.33 a	**
3	1	0.88±83.33 b	0.91±84.66 ab	0.88±87.66 ab	2.51±85.00 ab	0.33±88.33 a	*
	2	0.81±83.66	0.33±84.33	0.57±85.00	0.88±86.33	1.45±84.66	N. S
4	1	1.16±82.00 b	1.85±80.33 c	0.84±87.33 a	0.33±84.33 ab	0.71±84.33 ab	**
	2	3.33±76.66 b	1.45±82.66 ab	0.68±73.33 b	0.81±84.33 a	0.52±86.66 a	*
5	1	2.18±81.66	3.17±81.33	0.33±82.33	0.45±85.33	1.00±81.00	N. S
	2	2.00±81.00 b	0.57±85.00 ab	1.73±85.00 ab	1.25±84.66 ab	1.50±87.00 a	*
Average		0.73±80.76 c	0.48±84.26 ab	2.01±81.66 bc	0.15±86.00 a	0.26±84.93 ab	**

Means with different letters indicate a significant difference in probability level 0.05, 0.01 N. S: Not significant. *(P≤0.05), ** (P≤0.01). The treatment T1, T2, T3, T4, T5 are control treatments without addition, adding 25%, 50%,75%, 100% fermented feed, respectively.

periods	weeks	Stander error± Average					
		T1	T2	T3	T4	T5	Significant
1	1	2.84±84.33	2.18±85.66	2.88±85.00	2.64±79.00	3.33±83.33	N. S
	2	0.57±81.00 b	0.50±85.00 a	83.33 ab 1.76±	0.33±85.33 a	1.33±86.66 a	*
2	1	1.20±74.33 c	0.66±88.66 a	1.15±88.00 ab	0.66±89.33 a	0.45±85.66 b	**
	2	0.55±80.00 c	1.15±86.00 ab	0.57±83.00 bc	1.45±88.66 a	0.88±85.33 b	**
3	1	0.33±85.33	0.57±85.00	2.16±81.33	0.88±88.33	1.45±84.67	N. S
	2	2.08±83.00 b	1.20±84.33 ab	0.33±84.33 ab	1.00±88.00 a	0.50±85.00 ab	**

4	1	1.85±82.33 bc	1.76±78.66 c	0.88±84.33 b	0.33±90.33 a	1.73±85.00 b	*
	2	2.60±79.66 c	0.88±82.33 bc	1.45±87.33 ab	1.00±84.00 b	1.00±88.00 a	**
5	1	1.20±77.33 c	1.20±82.66 b	0.56±88.00 a	0.57±83.00 ab	2.88±85.00 ab	**
	2	2.40±83.33	1.85±86.33	1.52±85.00	1.85±83.66	1.15±86.00	**N. S**
Average		0.43±81.06 b	0.49±84.46 ab	2.48±82.96 ab	0.31±85.96 a	0.42±85.46 a	*

Means with different letters indicate a significant difference in probability level 0.05, 0.01 N. S: Not significant. *(P≤0.05), ** (P≤0.01). The treatment T1, T2, T3, T4, T5 are control treatments without addition, adding 25%, 50%,75%, 100% fermented feed, respectively.

Sperm concentration (X 109/ml)

Table (5) shows the effect of the study on the concentration of live cells during the study period, and it was found that there were no significant differences between the treatments during the first week of the first and third period. In the second week of the first period, it was found that there was a significant superiority (P≤0.05) for the treatments T2 and T4 compared to treatment T1 and it did not. There was no significant difference between treatments T1, T3, T5 as well as between treatments T2, T3, T4, T5, but in the first week of the second period, treatment T2 was significantly (P≤0.01) superior to T2 compared to treatments T1, T4, T5, and the two treatments T4, T3 were superior to Treatment T1 and there was no significant difference between treatments T2, T3 and also between treatments T3 and T4 as well as between treatments T1 and T5, while in the second week, treatments T4 and T5 were significantly (P≤0.01) superior to the rest of the treatments, and treatments T3 were superior to treatments T1, T2 and did not A significant difference appears between the treatments T1, T2 as well as the two treatments T4, T5. In the second week of the third period, treatment T3 was significantly superior (P≤0.05) compared to treatment T1 and the table did not show significant differences between treatments T1, T2, T4, T5 and also between treatments T2, T3, T4, T5, and in the first week of the fourth period, there was a significant (P≤0.05) for treatment T. 5 compared to treatments T1, T2, T4, and treatments T3, T4 were superior to treatments T1, T2 and treatment T2 was superior to treatment T1, and no significant difference was found between treatments T3, T4, as well as treatments T3, T5, while in the second week it was significantly superior (P≤0.05) Treatments T2, T3, T5 compared to treatment T1, and there was no significant difference between treatments T1, T4 and also between treatments T2, T3, T4, T5, but in the first week of the fifth period there was a significant (P≤0.05) superiority for treatment T5 compared to the rest of the treatments and the superiority of treatments T2, T3, T4 over treatment T1 and there was no significant difference between treatments T2, T3, T4 and in the second week and the adjusted average sperm concentration showed a significant (P≤0.01) for all F.F.treatments compared with the control treatment and no significant difference was found between treatments T2 ,T3,T4,T5.

Table (5): Effect of pelleted fermented feed in sperm concentration × 10^9 / ml for cocks.

periods	weeks	Stander error± Average					
		T1	T2	T3	T4	T5	**Significant**
1	1	0.05±8.10	0.22±8.92	0.05±8.19	0.32±8.45	0.50±8.46	**N. S**
	2	0.38±7.88 b	0.20±9.80 a	0.74± 8.71 ab	0.20±9.76 a	0.20±9.09 ab	*
2	1	0.17±7.92 d	0.18±9.55 a	0.37±9.00 ab	0.18±8.76 bc	0.17±8.13 cd	**

	2	0.57±7.45 c	0.08±7.15 c	0.59±8.63 b	0.04±10.03 a	0.42±10.39 a	**
3	1	0.16±9.67	0.47±10.60	0.70±10.48	0.10±10.38	0.14±11.05	N. S
	2	0.54±9.82 b	0.51±10.82 ab	1.30±12.38 a	0.81±10.78 ab	0.04±11.73 ab	*
4	1	0.22±13.86 d	1.24±15.00 c	2.69±17.07 ab	0.13±16.56 b	1.44±18.21 a	*
	2	2.47±10.81 b	1.46±15.26 a	0.93±17.13 a	1.37±12.70 ab	0.47±15.38 a	*
5	1	0.53±15.52 c	0.36±16.99 b	1.01±16.37 b	1.81±16.38 b	0.73±18.32 a	*
	2	2.63±13.20 b	0.67±14.91 a	0.38±14.87 a	0.38±16.10 a	0.48±16.34 a	**
Average		0.10±10.12 b	0.15±11.90 a	0.32±12.23 a	0.31±12.05 a	0.24±12.71 a	**

Means with different letters indicate a significant difference in probability level 0.05, 0.01 N. S: Not significant. *(P≤0.05), ** (P≤0.01). The treatment T1, T2, T3, T4, T5 are control treatments without addition, adding 25%, 50%,75%, 100% fermented feed, respectively.

Sperm Mortality %

It is noted from Table (6) the effect of the study on the percentage of dead sperm, and it was found in the first week of the first and second period that there was a significant improvement (P≤0.05) for treatments T2, T3, T5 compared to treatments T1, T4 and there was no significant difference between treatments T1, T4 and also between treatments T2, T3, T5, and there was no significant difference between the studied treatments during the second week for the first, second and fourth periods. In the first week of the third period, a significant improvement (P≤0.01) for the treatments T2, T3 compared to the two treatments T4, T5 and the improvement of treatment T1 compared to the treatment T5 and there was no significant difference between treatments T1, T2, T3 and also between treatments T1, T4, while in the second week, treatment T5 improved significantly (P≤0.05) compared to treatments T1, T2, and there was no significant difference between treatments T1, T2, T3, T4 As well as between treatments T3, T4, T5, and in the first week of the fourth period, treatment T3 improved significantly (P≤0.05) compared to treatment T1, and no significant difference appeared between treatments T2, T2, T4, T5 as well as between treatments T2, T3, T4, T5 either. In the first week of the fifth period, there was a significant improvement (P≤0.01) for the treatments T3, T4, and T5 compared to the two treatments T1, T2, and no difference was found. significant between the treatments T1, T2 and also between treatments T3, T4, T5, while in the second week, treatment T5 improved significantly (P≤0.05) compared to treatments T1, T2, T4 and the two treatments T2, T3 improved compared to treatment T1 and there was no significant difference between the two treatments T4 T1, and also between treatments T2, T3, T4, as well as between treatments T3, T5 As for the average rate of dead sperm, there was a significant improvement (P≤0.01) for the two treatments T3, T5 compared to the rest of the treatments and the improvement of treatment T2 compared to the two treatments T1, T4 and the improvement of treatment T4 compared to the treatment T1 and there was no significant difference between the two treatments T3 and T5.

Table (6): Effect of pelleted fermented feed on sperm mortality % for cocks.

periods	weeks	Stander error± Average					
		T1	T2	T3	T4	T5	Significant
1	1	0.51±6.50 a	1.00±4.00 b	0.88±3.66 b	0.76±6.52 a	0.28±3.50 b	*
	2	0.44±7.16	0.16±7.33	0.60± 6.66	0.60±7.10	0.50±6.46	N. S
2	1	0.16±7.83 a	0.28±4.50 b	1.69±4.66 b	0.72±7.33 a	0.44±4.83 b	*
	2	1.54±7.66	0.76±6.50	0.44±6.83	0.28±7.00	1.20±7.66	N. S
3	1	0.16±4.83 bc	0.44±3.16 c	1.04±3.00 c	1.09±5.83 ab	0.88±7.66 a	**
	2	0.85±9.70 a	0.16±9.83 a	1.60±7.85 ab	0.97±7.60 ab	1.32±5.63 b	*
4	1	0.27±5.06 a	0.92±3.60 ab	0.08±2.46 b	0.76±4.23 ab	1.01±3.55 ab	*
	2	2.18±3.66	0.57±4.00	0.57±3.00	1.20±3.33	0.57±3.00	N. S
5	1	0.72±6.33 a	0.58±5.25 a	0.72±2.16 b	0.44±3.16 b	0.66±2.16 b	**
	2	0.61±7.30 a	0.96±5.06 b	0.88±4.66 bc	0.88±5.66 ab	0.33±2.66 c	*
Average		0.16±6.70 a	0.13±5.22 c	0.07±4.39 d	0.13±5.88 b	0.11±4.63 d	**

Means with different letters indicate a significant difference in probability level 0.05, 0.01 N. S: Not significant. *(P≤0.05), ** (P≤0.01). The treatment T1, T2, T3, T4, T5 are control treatments without addition, adding 25%, 50%,75%, 100% fermented feed, respectively.

Discussion

The improvement in the qualitative characteristics of semen for treatment T5 in ejaculation volume and treatment T4 in collective motility and treatments T4, T5 in individual motility and all treatments of fermented fodder in sperm concentration and percentage of dead sperm compared with the control treatment may be due to feeding on fermented forage where there is a direct and influential relationship Between nutrition and herd fertility (Safari et al.,2018) and one of the products of the fermentation process is fatty acids that are involved in the biological activities of sperm (Cerolini et al., 2003) as they affect the formation and functions of sperm (Bongalhardo et al., 2009), as they enter into the formation of the sperm membrane and thus affect membrane integrity, function and fertilization ability (zadeh et al., 2020), or the cause may be through improved digestive health and immune system support after feeding on fermented forage (Otutumi et al., 2012) in which probiotic bacteria stimulate the immune system by stimulating microphage cells to produce interleukins and CD4 cells (T-helper lymphocytes) (Naji, 2007) and thus I secrete interleukin-10 (IL-10) and that CD4 and IL-10 cells stimulate Lydec cells to produce testosterone, and this activates the reproductive efficiency of roosters (Liva and Voskuhl, 2001) fed fermented forage, as testosterone has an essential role in Improving the characteristics of the semen and the process of sperm formation (Al-Hayani, 2012), or the reason may be due to the fact that fermentation of the feed results in a high percentage of protein in it (Pranoto et al., 2013). In addition, the fermentation process increases the amino acids, including methionine and lysine (Pranoto et al., 2013: Nkhata et al., 2018), which increases the protein digested and absorbed by the bird and increases the availability of minerals (Pranoto et al., 2013) which It reflected positively on the birds and improved their histological characteristics, which increases the development of the epithelial cells of the intestine and thus improves the health of the digestive system and thus is

reflected in the efficiency of utilizing the ingested feed and improving the productivity and reproductive efficiency of the cocks (Bron et al., 2002), and the improvement of semen quality may be due to the role of bacteria Biopromoter in the synthesis of minerals and vitamins in bird gut and fermented forage that supports semen quality Studies show that Lactobacillus bacteria synthesize trace minerals (Nagy et al., 2016), antioxidant vitamins (E and C) and B group vitamins (LeBlanc et al., 2011) Vitamins (B12, E, and C) work to ensure improved sperm motility (Banihani, 2017), and trace minerals such as selenium, zinc, and manganese produced by these bacteria also act. On enhancing spermatogenesis in poultry (Barber et al., 2005), moreover, proteins produced by probiotic bacteria that are absorbed by the gastrointestinal tract of birds improve semen quality (Dim et al., 2020), and the probiotic supports superior fluid quality. In addition, the probiotic bacteria, especially the Bacillus genus, can produce antioxidants, which in turn improve the characteristics of the semen, as high concentrations of glutathione were found. Glutathione peroxidase in testicular tissues (Lenzi, 2000) and sperm are affected by oxidative factors such as free radicals where glutathione peroxidase protects the developing sperm from DNA damage caused by oxidative stress (Foresta et al., 2002). Biological oxidation and semen quality. The reason was also attributed to the fact that the probiotic bacteria can produce vitamin E, which is an excellent biological antioxidant that breaks the chain and protects cells and tissues from lipid peroxidation caused by free radicals, which is reflected in the formation and production of sperm, in addition to the microbial balance inside the intestine. It improves the absorption of other antioxidants such as vitamins and minerals, which positively affects the health of the bird and its reproductive efficiency (Inatomi and Otomaru, 2018).

Conclusion

In conclusion, the study showed that the fermented feed with the probiotic improves the efficiency conversation of the consumed feed, thus providing more nutrients to the roosters, meanwhile, fermentation increases the breaking of complex bonds that the bird is unable to digest, which is reflected in the reproductive performance of the roosters, as well as converting the fermented feed into pellet Which facilitates the transportation, circulation, and storage of fermented feed, in addition to the fact that the pelleting process has multiple benefits from a nutritional point of view for poultry, if the process of fermenting feed and then turning it into pellet is a promising industry in the farm of the poultry feed industry.

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دور العلف المخمر والمحبب في تحسين صفات السائل المنوي لديكة أمهات الدجاج البياض

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الملخص:

استخدم المعزز الحيوي العراقي الحاوي على بكتريا *Lactobacilli, Bifid bacterium, Bacillus subtilis* وخميرة *Saccharomyces cerevisiae* لتخمير العلف هوائيا لمدة 48 ساعة وبعد اكتمال عملية التخمير جفف العلف وحول الى محببات علفية بواسطة ماكينة تحبيب في مجرشة البركة/ محافظة بابل، بعدها أجريت التجربة الحقلية في حقل كلية الزراعة/ جامعة القاسم الخضراء أذ استخدم 30 ديك قسمت الى خمسة معاملات كل معاملة 6 ديكة قسمت الى ثلاث مكررات وكانت المعاملات T5, T4, T3, T2, T1 غذيت على العلف المخمر بنسب (0، 25، 50، 75، 100 % على الترتيب) وقيست الصفات النوعية للسائل المنوي خلال فترة الدراسة التي استمرت 20 اسبوعاً، أظهرت نتائج الدراسة تفوق عالي المعنوية ($P\leq0.01$) للمعاملة T5 في معدل حجم القذفة كما تفوقت جميع معاملات العلف المخمر في معدل حركة الحيامن الفردية والجماعية وتركيز الحيامن، كما حصل تحسن عالي المعنوية ($P\leq0.01$) لجميع معاملات التغذية على العلف المخمر في نسبة الحيامن الميتة مقارنة مع معاملة السيطرة.

الكلمات المفتاحية: ديكة، المعزز الحيوي، عملية التخمير، الصفات النوعية للسائل المنوي.