

EFFECT OF USING LOPERAMIDE HYDROCHLORIDE ON SOME PRODUCTION TRAITS IN BROILER CHICKENS

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Abstract:

This experiment was conducted at a Al-Mussaib technical institute poultry farm from 25/3/2014 to 5/5/2014 to evaluate the effect of using loperamide hydrochloride on body weight, weight gain, feed conversion ratio and feed intake on Ross 308 broiler chickens. Fifty four chicks at age 14 days were divided into two equal (control and treatment) groups with three replicates for each group. Feed and water were *ad libitum*. At 14 days of age the control group treated with water without any addition while 1mg loperamide hydrochloride was added to drinking water of the treatment group. Primary chicks body weight, weekly and final; body weight, weight gain, feed intake, feed conversion ratio were estimated, as well as final blood glucose and packed cell volume were estimated at the end of experiment. The results indicated that no significant differences were found in weekly and final body weights, packed cell volume and blood glucose, but there were significant ($P \leq 0.01$) differences in weekly and final feed intake and feed conversion ratio between control and treatment group. That's might be due to loperamide hydrochloride for reducing intestinal motility and increase digestion and absorption time of nutrients in the feed. This experiment was indicated that loperamide hydrochloride can be used in poultry production to increase nutrients absorption efficiency in the feed and decrease wastes in ration.

Key word: broiler, chicken, loperamide, hydrochloride, production.

تأثير استخدام هيدروكلوريد الليبرومايد على بعض الصفات الإنتاجية في فروج اللحم

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الملخص:

أجريت هذه التجربة في حقل الدواجن التابع للمعهد التقني في المسيب للمدة من 25/3/2014 الى 5/5/2014 لمعرفة تأثير استخدام هيدروكلوريد الليبرومايد على وزن الجسم، وكفاءة التحويل الغذائي، والعلف المستهلك في دجاج اللحم نوع روس 308، إذ تم تقسيم 54 دجاجة بعمر 14 يوماً إلى مجموعتين متساويتين وبثلاث مكررات لكل مجموعة. وتم إعطاء الماء والعلف بصورة حرة لكلا المجموعتين. وبعمر 14 يوماً أعطيت المجموعة الأولى (مجموعة السيطرة) الماء بدون أي إضافة، بينما أضيف هيدروكلوريد الليبرومايد بتركيز 1ملغم لكل لتر ماء إلى المجموعة الثانية (مجموعة المعاملة). تم اخذ أوزان الأفراخ الابتدائي والزيادة الوزنية واستهلاك العلف وكفاءة التحويل الغذائي اسبوعياً وعند نهاية التجربة بعمر 42 يوماً ، وكذلك تم قياس نسبة الكلوكرز في الدم وحجم خلايا الدم المرصوص عند نهاية التجربة. أظهرت النتائج عدم وجود فرق معنوي بين مجموعة الدجاج المعامل بهيدروكلوريد الليبرومايد ومجموعة السيطرة في وزن الجسم الاسبوعي والكلبي وحجم خلايا الدم المرصوص وسكر الدم، ولكن وجد فرق معنوي ($P \leq 0.01$) بينهما لصالح مجموعة المعاملة في استهلاك العلف ومعامل التحويل الغذائي الاسبوعي والنهائي. وقد يعود ذلك لدور دواء هيدروكلوريد الليبرومايد في تقليل سرعة مرور الغذاء وبالتالي زيادة مدة هضم وامتصاص المواد الغذائية. أشارت هذه التجربة إلى إمكانية استخدام دواء هيدروكلوريد الليبرومايد في زيادة كفاءة امتصاص المواد الغذائية في العلف وفي تقليل الهدر في المواد العلفية.

الكلمات المفتاحية: دجاج لحم، هيدروكلوريد، ليبرومايد، إنتاج.

Introduction:

Loperamide, (loperamide hydrochloride), 4-(p-chlorophenyl)-4-hydroxy-N,N-dimethyla,a-diphenyl-1-piperidinebutyramide

monohydrochloride, is a synthetic antidiarrheal for oral use, and its effects were attributed to an inhibitory action on smooth muscle tone and peristalsis mediated via both cholinergic and non-cholinergic

systems(Theodorou *et al*, 1991, and Karim *et al*, 1977). Loperamide modified prostaglandin E (PGE) induced secretion of fluid in the rat intestinal tract and its antidiarrhoeal action might be related not only to an effect on intestinal motility, but also on secretory processes(Karim *et al*, 1977). Loperamide inhibits PGE, and cholera toxin-induced secretion (Sandhu, *et al* 1981) *In vitro* and animal studies show that Imodium® (loperamide hydrochloride) acts by slowing intestinal motility and by affecting water and electrolyte movement through the bowel. Loperamide binds to the opiate receptor in the gut wall. Consequently, it inhibits the release of acetylcholine and prostaglandins, thereby reducing peristalsis, and increasing intestinal transit time (Vacantil® fact sheet). The maximum stability of loperamide

hydrochloride was shown to be at an approximate pH of 4.5. (Yu-Hsing,1989).

Chicks have a very fast rate of digesta passage (Lee *et al*, 2014) and using of loperamide might reduce intestinal motility and increase absorption time of nutrients in the feed so the aim of this study is to evaluate the effect of loperamide hydrochloride on the chicken weight, feed intake, feed conversion ratio, blood glucose, and packed cell volume.

Materials and methods:

This experiment was done at a Al-Mussaib technical institute poultry farm from 25/3/2014 to 5/5/2014. Fifty four one day old broiler chicks (Ross 308) were reared under suitable conditions. Feed (table 1) and water were *ad libitum*.

Table 1. Ingredients percentage and nutrient composition of broiler starter and finisher ration.

Ingredients	Broiler starter (%) (1 – 3 weeks)	Broiler finisher (%) (4 – 7 weeks)
Yellow corn	44.4	45.2
Wheat	16	16
Soya bean	24.6	23.4
Protein concentrate	11	10
Vegetable oil	2.3	3.7
Salt	0.3	0.3
Di Calcium phosphate	1.4	1.4
Chemical analysis*		
Crude protein (%)	21.03	20.17
Metabolisabl energy(M.E.)/kcl/kg	3007.68	3105.12
Lysine	1.09	0.98
Methionine	0.48	0.44

*Chemical analysis was according to (NRC, 1994).

At 14 days of age, chicks were divided into 2 equal groups with 3 replicates per each group. The 1st group (Control group) was watered with tap water without any additive, while the water of the 2nd group (Treatment group) was containing 1mg/liter loperamide hydrochloride (Vcontil® 2mg tablets of loperamide hydrochloride, Manufacture by Medochemie Ltd, Cyprus). Weekly body weight were measured by digital electronic balance (accuracy ± 5 gm) after withdrawal of loperamide 8 hours before weighting, feed consumption, and feed conversion ratio (FCR) were also counted (Naji, 2006). At age 42 days 2ml of direct heart blood were collected from 15 birds of each group in test tubes to obtain blood serum for measuring blood sugar (Asatoor *et al*, 1954), and a direct packed cell volume (PCV) were measured by using wing vein fresh blood (Archer, 1965).

Student's t-test and analysis of variance (ANOVA) table were used to determine the significant differences between groups by calculating least significant difference (LSD). Means and stander error (SE) were also measured by using statistical package for the social sciences (SPSS 18 software) (Argyrous, 2005)

Result and discussion:

The results indicated that no significant differences were found in body weights, but there were significant ($P \leq 0.01$) differences in feed intake and feed conversion ratio between control and treatment groups in all estimated weeks and for accumulative feed intake and feed conversion ratio except week 6 in feed conversion ratio in control group was better than treatment group as shown in That's might be due to loperamide hydrochloride reduce intestinal motility and increase digestion and absorption time of nutrients in the feed (Theodorou *et al*, 1991). Small intestine is relatively short (about 125 cm long) and represents about 50% of the total gastro intestinal tract (GIT) in adult chickens. Large intestine is also short and has a short colon and two long ceca both colon and ceca are capable

of absorbing water, electrolyte, glucose, and amino acids. The ceca are two blind pouches located in the join between small and large intestines. Some of the water remaining in the fecal material was reabsorbed there. Another important function of the ceca is the fermentation of any remaining coarse materials. They produce several fatty acids as well as the eight B vitamins (Thiamine, riboflavin, niacin, pantothenic acid, pyridoxine, biotin, folic acid and vitamin B12). Because the ceca are located so close to the end of the digestive tract, however, very little of the produced nutrients are absorbed and available to the chicken (Lee *et al*, 2014, Duke, 1994, and Jacquie *et al*, 2011). Therefore slowing intestinal motility and increasing intestinal transit time (Yu-Hsing, 1989) might increase absorption of nutrients by eating less amount of food and this might explain the significant decrease in FCR for treatment group by eating less amount of food with no significant differences in body weights compared with control group except for week 6 where there was a significant in FCR for control group which is might be due to the dose of loperamide which should be increase. Despite there were a significant ($P \leq 0.05$) differences in weight gain for control group at age 28 and 42 day and accumulative weight gain, and for treatment group at age 35 day but the feed conversion ratio is more important economic indicator (Naji, 2006, and Willems *et al* 2013). As shown in table 2 there were no significant differences in packed cell volume and blood glucose which might indicated that using loperamide have no side effect on those parameters and its safe to use in healthy chickens.

However, only one concentration of the loperamide was investigated in the present study and additional studies directed towards demonstrating a dose-related effect of loperamide, and its effect on other poultry performance and physiological aspects should be done.
table 2.

Table -2- Body weight, feed intake, food conversion ratio, packed cell volume, and blood glucose parameters for control and treatment groups in different days of chicken age.

Age(days) Parameters		21	28	35	42	Accumulative
Body weight (gm)	Control	871.30±9.03	1332.96±16.51	1771.11±32.44	2111.30±59.71	-----
	Treatment	873.15±7.62 N.S.	1320.19±11.31 N.S.	1804.81±28.14 N.S.	2071.48±62.97 N.S.	-----
Feed intake (gm)	Control	6393.33±19.65	7493.00±29.14	9785.00±11.55	13545.0±10.41	37216.33±33.96
	Treatment	5745.00±14.43 **	7020.00±18.03 **	9410.00±15.28 **	12911.67±28.92 **	35068.67±36.32 **
Weight gain (gm)	Control	451.106±1.396	461.66±1.47	438.143±0.807	340.19±1.335	1693.24±1.858
	Treatment	452.773±1.785 N.S.	447.033±1.615 *	481.846±4.73 *	266.67±1.785 *	1651.111±0.555 *
Feed conversion ratio(FCR)	Control	1.57±0.009	1.8±0.007	2.48±0.004	2.19±0.008	2.03±0.002
	Treatment	1.41±0.004 **	1.75±0.002 **	2.17±0.022 **	2.27±0.016 *	1.93±0.002 **
PCV%	Control	-----	-----	-----	30.07±0.84	-----
	Treatment	-----	-----	-----	29.73±0.94 N.S.	-----
Blood glucose mg/100ml	Control	-----	-----	-----	232.37±2.30	-----
	Treatment	-----	-----	-----	231.87±2.51 N.S.	-----

* The mean difference is significant at the 0.05 level.

** The mean difference is significant at the 0.01 level.

N.S. Mean not significant.

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