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Partial Ablation of Uropygial Gland Effect on Production Performance of Akar Putra Chicken

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Abstract: In an experiment with 120 Akar Putra chicken, the partial uropygialectomy effects at 4 ages on production performance was determined. The experiment comprised 5 treatments (24 chicken/treatment), with 3 replicates for each (8 chicken/replicate). Experimental treatments consist of a control treatment T1, partial ablation of uropygial gland (uropygialecomy) were applied on T2, T3, T4 and T5 treatments at 3, 4, 5 and 6 weeks, respectively. Body weight, weight gain, feed intake and feed conversion ratio for males and females were recorded weekly. The results revealed remarkable significant ($p<0.01$) enhancing for partial uropygialectomy treatments than control group in all of males and females body weight, weight gain, feed intake and feed conversion ratio measurements. Variation ratio of production performance parameters for Partial Uropygialectomy treatments than control group was calculated to support the results. Best results were indicated in T2 treatment when partial uropygialectomy performed at week 3.

Key words: Avian gland, uropygial gland, Akar Putra chicken

INTRODUCTION

Akar putra is a local Malaysian chicken, the cross breeding process was happened by chance when the wild jungle fowls entered University of Putra Malaysia grounds and mated with their chicken (ayam kampong). Akar putra has a more robust growth process than its parents because the maturation period is shorter (less 13 weeks), it can lay 120-200 eggs per year and it has more resistance to diseases (Kasim, 2007).

Uropygial gland is the only subcutaneous gland in birds body (Mclelland, 1990). It has many names like preen gland based on its function in preening the bird's feather (Lucas and Stettenheim, 1972; King and Mclelland, 1984), oil gland depending on its oily secretion (Andreas *et al*., 2002). Also it called uropygial gland based on its position which is on the base of the tail, dorsally between the fourth caudal vertebrae and the pygostyle (Lucas and Stettenheim, 1972; Sawad, 2006a). The function of gland is still a subject of controversy. There are many accepted functions of gland secretions like conferring water-repellent properties on the feather coat and maintaining the suppleness of it. Also, it's proposed to be associated to pheromone production, control of plumage hygiene, thermal insulation and defense against predators (Jacob, 1992; Montalti *et al*., 2000; Soler *et al*., 2012; Vincze *et al*., 2013). Uropygial gland is completely absent in Struthionidae, Rheidae, Casuariidae, Dromaiidae and in a few species of Columbidae and Psittacidae (Johnston, 1988). Montalti and Salibian (2000) mentioned that the oil of uropygial gland is not important to the birds who do not have it. While Goo Dwin (1983) said the uropygial gland in some of birds is non active. After that, Brett *et al*. (2003) and Moyer *et al*. (2003a) gave explanation that the birds who do not have uropygial gland use dusters bath to keep and clean their feather.

The histology of the uropygial gland has been studied in different bird species and some dissimilar characteristics have been described (Hsu, 1936; Bo, 1953; Bhattacharyya, 1972; Bride, 1975; Menon *et al*., 1981; Kamiya *et al*., 1986; Suzuki, 1994; Montalti *et al*., 2001; Sandilands *et al*., 2004; Sawad, 2006b; Harem *et al*., 2010; Sadoon, 2011).

Modern commercial breeds of meat chicken characterized by super-fast growth and high efficiency of food conversion ratio as a result of intense genetic election. There are many studies that confirm this, Wepruk and Church (2003) observed that the final body weight of broiler in 1976 was 2 kg at the age of 63 days while the same average of body weight was arrived at age 35 days in 2001. These improvement in the growth rate reflected negatively on the diseases resistance and immune response of these birds, because of negative genetic link coefficient was observed between the

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growth speeds and immune response (Qureshi and Havenstein, 1994). In this context, increasing in mortality ratio in these strains of birds have happened due to increasing their susceptibility to bacterial diseases and metabolic diseases. These occurred as a consequence of irregular metabolic processes, an imbalance in the acid-base balance-baseband Acid-base balance of body fluids such as ascites disease, sudden death syndrome (SDS) and increased skeletal disorders like legs abnormalities. It has been scientifically proven that highest rates of those pathological conditions were showed in herds and individuals rapid growth chicken at 3rd and 4th weeks of age (Robinson *et al*., 1992; Julian, 1997, 1998; Leeson and Summers, 1997; Tottori *et al*., 1997; Gonzales *et al*., 1998, 2000).

Formulation of the problem: Based on the limitation of the problem, the researcher formulate the problem whether innovating a safe technique to raise the level of poultry production performance in general and local Malaysian chicken (Akar Putra) particularly without using genetic improvement methods, which have proved that it has negative impacts on birds' immunity.

Objective of the research: The objective of this research is to examine whether applying Partial Uropygialectomy (PU) can improve the level of Local Malaysian chicken (Akar Putra) production performance.

The Research Significance:

a: To identify the information about Akar Putra chicken production performance because its new specious of chicken
b: To identify the scientific information about PU operation effect on the production performance of chicken

Practical: Practically, this research is used to identify the effect of PU on the production performance of Local Malaysian chicken (Akar Putra) at 4 ages.

Hypothesis: Based on the literature review and theoretical framework, the researcher made a hypothesis that removing Uropygial gland may have positive impacts on the production performance of Akar Putra chicken.

MATERIALS AND METHODS

Research design: This research is an experimental research. This research design with Complete Random Sampling Design (RAL) with 5 variables in which it was divided into two groups, they are, 1 control group and 4 treatment variables with different ages of applying Partial Uropygialectomy.

Setting of the research: The research was conducted in: a Farm of Veterinary Medicine Faculty in University of Putra Malaysia (UPM) for breeding the chicken.

Time: The research was conducted from 15th December 2014 to 15th March 2015.

Research variables: The variables which were observed in this research were.

Independent variables: The variation of partial uropygialectomy (PU) in following requirements:

T1: Group without PU operation (control group)
T2: Group which was PU applied at week 3
T3: Group which was PU applied at week 4
T4: Group which was PU applied at week 5
T5: Group which was PU applied at week 6

Dependent variable: Body weight, weight gain, feed intake and feed conversion ratio for males and females were recorded from week 1 until week 12.

Population and sample of the research:

1: Research population were a day old chick Local Malaysian chicken (Akar Putra)
2: Research sample were 120 Akar Putra chicken randomly assigned to five treatment groups by 24 (12 male and 12 female) chickens per treatment and each treatment consist of three replicates of 8 chickens (4 males and 4 females) for a duplicate one

Tools and materials: This research used some tools and materials to support the process of this research.

Tools: Lidocaine, 70% Alcohol, Iodine, Scalpels and blades.

Materials: The materials used in this research consisted of a Day Old Chick of Local Malaysian chicken (Akar Putra) Strain, The chicks were reared in broiler cages under standard management conditions throughout the experimental period of 12 weeks. The birds were given *ad libitum* access to feed and water.

Procedure of the research: This research was conducted in several stages as follows:

1: Partial Uropygialectomy operation was applied as the steps below:

a: Bird restraint
b: Local anesthesia using lidocaine HCL (4 mg/kg) SQ
c: Removing the uropygial gland partially (half lobes, half isthmus and papillae) by scalpel which sterilized by 70% alcohol before use

Table 1: Mean (±S.E.) males body weight (g/bird) for control and partial uropygialectomy treatments from 1-12 week

	Treatments				
Week	T1	T2	T3	T4	T5
1	60.667±2.603	59.333±3.48	62.333±3.18	56.667±3.383	59.333±2.906
2	112.667±3.756	114.333±3.756	114±3.464	109.667±4.631	105.667±3.48
3	179±4.359	181.666±3.756	189±3.786	188.333±4.333	175.333±3.756
4	277.333±6.642^{c}	333.333±5.487^{a}	288±4.359^{bc}	299±5.508^{b}	280.667±6.36^{bc}
5	343.667±9.838^{c}	399.333±4.91^{b}	391.667±8.09^{b}	436±4.041^{a}	340.667±6.936^{c}
6	499.333±14.146^{d}	589.333±8.373^{b}	640.667±7.513^{a}	591.667±8.09^{b}	548.333±9.528^{c}
7	717.333±12.129^{c}	815.667±9.244^{a}	770.667±8.09^{b}	775.333±7.219^{b}	728±7.81^{c}
8	869.667±16.746^{b}	943.333±13.296^{a}	917.667±13.86^{a}	927.667±12.129^{a}	908.667±10.398^{ab}
9	1041.333±17.61^{c}	1093.667±10.975^{b}	1143.667±12.129^{a}	1094.667±13.86^{b}	1101.333±12.991^{ab}
10	1165.333±18.765^{c}	1282.667±14.438^{ab}	1325.333±15.301^{a}	1258±13.577^{b}	1260.333±11.837^{b}
11	1290.667±19.633^{b}	1427.667±12.129^{a}	1471±13^{a}	1434.667±15.015^{a}	1441±11.269^{a}
12	1390.667±20.21^{d}	1673±14.154^{a}	1598.333±12.414^{bc}	1577.667±12.414^{c}	1639.333±9.244^{ab}

Mean values with common superscript in row differ significantly ($p<0.01$). Mean values at week 8 differ significantly ($p<0.05$)

d: After removing the gland, the incision area sterilized with Iodine

2: Body weight, weight gain, feed intake and feed conversion ratio for males and females were recorded separately from week 1 till week 12

3: Variation ratio of the production performance parameters has recorded by the following formula:

$$[(A-B)/B)]*100$$

A: Treatment data, B: Control group data

Research design and data analysis: This research used one way complete random sampling. The gained data which was resulted were analyzed by one way analysis of Variance (ANOVA). If the treatment significantly affected the chicken, LSD and Duncan's (1955) Multiple Range would be applied (DRMT) (Gaspers, 1991; Genstat, 2003). Differences between treatments were considered significant level at $p<0.01$.

RESULTS

Body weight: The results at week 12 (Table 1) indicated that the males of Akar putra chicken in T2 group showed higher body weight followed by T5, T3 and T4 when compared with control group. Variation ratio of PU treatments than control group were T2 = 20.302%, T5 = 17.881, T3 = 14.933 and T4 = 13.447. Even though, there are no significantly different between T2 and T5, also between T3 and T4. Furthermore, the females of T2, T4 and T5 at week 12 showed higher body weight than control and T3 groups (Table 2). The variation ratios were as fallowing: T2 = 26.885%, T4 = 26.671%, T5 = 26.138% and T3 = 4.303%. No significantly impact between T2, T4 and T5, also between T1 and T3 were observed. The statistical analysis revealed significant ($p<0.01$) difference in body weight.

Feed intake: Table 3 shows, no significantly differences were observed in the total males feed intake parameter. However, the oscillatory in signification different were shown between treatments along the trial period. In females, T4 and control groups shown highly significantly ($p<0.01$) different than other groups in the total of females feed intake as shown in Table 4.

Variation ratio of females PU treatments were as fallowing: T3 = -25.455, T2 = 14.943%, T5 = 7.459 and T4 = 6.93%. Whereas, there is significant different ($p<0.01$) between T5 and T3. But no different between T2 and T5, also between T2 and T3 were indicated.

Weight gain: The results in Table 5 and 6 show highly significantly ($p<0.01$) improvement in the total weight gain parameter for males and females PU treatments compared with control group.

In males, highest variation ratio in a total weight gain than control group observed in T2 = 20.93% fallowed by T5 = 18.52%, T3 = 15.498% and T4 = 14.17%. No significantly different between T2 and T5, also between T3 and T4 as well were observed.

In females, same variation ratio in a total weight gain compared with control group was gotten in T2 and T4 = 28.08% fallowed by T5 = 27.488% and T3 = 4.81%. Even though, no significant effect between T2, T4 and T5 treatments, while significantly different between these treatments and T3 group was reported.

Feed conversion ratio: Depending on the total feed conversion ratio for treatment groups, positive significantly effect ($p<0.01$) was indicated in males and females PU treatments compare with control group as shown in Table 7 and 8. The variation ratio than control group in males were as fallowing: T5 = -15.1, T4 = -12.9, T2 = -12.5 and T3 = -8.293. While in females were T2 = -33.591%, T3 = -28.876%, T5 = 27.412 and T4 = -16.513. Whereas, significantly different ($p<0.01$) between T5, T4 and T2 than T3 group in males and between T2, T3 and T5 than T4 group in females were indicated.

DISCUSSION

Present research observed that the uropygial gland located on the base of the tail, dorsally to the levator caudal muscle. It can be evidenced by palpation above the last sacral vertebra and the first caudal vertebrae.

Table 2: Mean (±S.E.) females body weight (g/bird) for control and partial uropygialectomy treatments from 1-12 week

	Treatments				
Week	T1	T2	T3	T4	T5
1	61.333±3.18	60.333±2.603	62.333±3.18	59.333±2.603	59.667±2.603
2	111.333±8.373	114.333±3.18	114.333±6.064	108.333±7.513	109.667±4.91
3	178±5.196	182.667±4.055	180.667±4.055	170.667±3.756	174.667±3.18
4	277.333±12.414^{b}	333.667±6.36^{a}	287.667±9.821^{b}	280.667±9.244^{b}	274.333±8.373^{b}
5	345.333±11.837^{b}	399.333±8.373^{a}	390.667±11.26^{a}	350.333±9.528^{b}	350.333±9.821^{b}
6	470.333±10.99	500.667±8.09	491±10.693	490.333±10.105	454.667±10.105
7	503.5±15.878^{b}	620±8.373^{a}	543±14.146^{b}	632±13.569^{a}	651.5±11.837^{a}
8	624.667±16.746^{c}	716±11.269^{b}	650.667±15.015^{c}	741.333±14.723^{ab}	781.333±12.414^{a}
9	716±15.308^{c}	830.333±8.373^{b}	740.333±14.146^{c}	878.333±13.569^{a}	909.667±11.837^{a}
10	815.667±18.765^{c}	934.667±7.219^{b}	836.667±17.033^{c}	999.333±12.991^{a}	999.333±10.682^{a}
11	877.333±19.919^{b}	1043.333±8.95^{a}	921.333±15.301^{b}	1079.667±15.592^{a}	1053.333±14.723^{a}
12	937.333±21.942^{b}	1189.333±14.146^{a}	977.667±17.61^{b}	1187.333±17.61^{a}	1182.333±15.301^{a}

Mean values with common superscript in row differ significantly (p<0.01)

Table 3: Mean (±S.E.) males feed intake (g/bird) for control and partial uropygialectomy treatments from 1-12 week

	Treatments				
Week	T1	T2	T3	T4	T5
1	55.333±3.756	57.333±2.603	57.333±3.18	58.667±3.18	49.667±2.603
2	124.667±3.18^{a}	94.667±2.603^{c}	101.333±3.18^{bc}	125.333±3.18^{a}	105.333±2.603^{b}
3	159±6.083^{b}	137.667±3.48^{c}	154.333±3.18^{b}	174.667±4.631^{a}	180.667±5.207^{a}
4	195.667±5.487	197.333±4.333	186±3.786	203.333±4.333	204.333±3.48
5	231.333±6.642^{b}	275.333±2.603^{a}	175.333±5.487^{c}	215.333±6.642^{b}	229.333±2.906^{b}
6	394.667±10.105^{c}	498.333±4.333^{a}	449.667±5.207^{b}	372.333±6.642^{d}	404.333±6.064^{c}
7	485.333±11.26^{ab}	515.333±6.064^{a}	499.667±9.821^{a}	468.667±9.244^{b}	509.333±8.09^{a}
8	447.667±11.05^{bc}	460.333±3.18^{ab}	485.667±10.975^{a}	419.667±10.682^{c}	452.333±8.373^{b}
9	499.333±12.706^{b}	533.333±4.91^{a}	550.333±8.373^{a}	456.667±7.219^{c}	406.333±7.796^{d}
10	441.667±13.017	480.667±8.09	490.333±10.682	479.333±11.26	473.667±10.682
11	534.6667±15.592^{c}	543.333±8.95^{bc}	589.667±14.723^{a}	585.333±11.837^{a}	579.667±10.975^{ab}
12	507.333±15.301^{b}	520.6667±10.398^{b}	578.333±14.723^{a}	492.667±12.129^{b}	508±13^{b}
Total	4076.667±114.062	4314.333±61.526	4318±93.254	4052±90.945	4103±81.697

Mean values with common superscript in row differ significantly (p<0.01). Mean values at week 7 and 11 differ significantly (p<0.05)

Table 4: Mean (±S.E.) females feed intake (g/bird) for control and partial uropygialectomy treatments from 1-12 week

	Treatments				
Week	T1	T2	T3	T4	T5
1	58.333±2.603	57.333±2.603	56.333±3.48	58.667±3.18	50.333±2.603
2	81.667±5.487^{c}	95.333±2.603^{b}	101.333±4.91^{b}	125.333±3.756^{a}	136.333±4.333^{a}
3	125.667±7.219^{c}	137.333±4.91^{bc}	154.333±6.064^{b}	174.333±5.487^{a}	180.333±4.91^{a}
4	197.667±4.41^{bc}	197.667±2.333^{bc}	187.667±4.631^{c}	203.333±4.91^{b}	237.333±3.756^{a}
5	231.333±8.373^{b}	275.667±4.055^{a}	175.333±6.064^{c}	215.333±7.219^{b}	262.333±4.91^{a}
6	276.667±11.26^{a}	165.333±6.064^{c}	196.667±8.09^{b}	280.667±8.667^{a}	148.333±7.219^{c}
7	249.333±11.837^{a}	203.333±8.373^{b}	211.333±10.682^{b}	194±10.693^{b}	152.333±9.528^{c}
8	290.333±13.569^{a}	219.333±8.95^{b}	157.667±11.837^{c}	267.333±12.706^{a}	300.667±9.821^{a}
9	267.667±12.129^{b}	239.667±9.244^{b}	185.667±11.837^{c}	376.333±9.838^{a}	271.667±9.244^{b}
10	358.667±15.015^{a}	213.333±9.528^{c}	203.333±12.414^{c}	355.667±12.414^{a}	266±10.116^{b}
11	261.333±14.723^{a}	241.667±11.837^{ab}	215.333±15.301^{b}	275.333±12.991^{a}	172.667±12.414^{c}
12	309.333±15.878^{b}	257.333±12.991^{c}	173.667±15.015^{d}	369.333±14.146^{a}	327.667±13.283^{ab}
Total	2708±122^{ab}	2303.333±83.455^{cd}	2018.667±110.282^{d}	2895.667±105.96^{a}	2506±92.121^{bc}

Mean values with common superscript in row differ significantly (p<0.01)

These results are coincident with those reported by Nickel *et al*. (1977); Montalti and Saliban, (2000); Gezici, 2002) and pointed out with Aslan *et al*. (2000) who reported that the gland is lying on the pygostyle muscle. Uropygial gland in Akar Putra chicken has hart shape with broad bean size. While Calislar (1986) mentioned that the gland has chicken egg size in pelican bird and almond bean in ducks. Present experiment found that the uropygial gland contains right and left lobes which have been separated by inter-lobular barrier except the lobes adhesion area in the isthmus at the third back of the gland and this observations consistent with Getty (1975). Uropygial gland has an uropygial papillae lies dorso-caudally of the gland and have uropygial wike. The gland canals have a single opening at each lobe and possess a pair of canals. While Shawkey *et al*. (2003) stated that the uropygial papillae in geese was short, wide and held two openings for their canals, in chickens the papillae is long and thin while in turkey the papillae is wide on the other hands some birds such as Musk duck lack the uropygial wike.

The results showed that the partial ablation of the uropygial gland did not have any serious consequence for the survival of Akar Putra chicken and no mortality

Table 5: Mean (±S.E.) males weight gain (g/bird) for control and partial uropygialectomy treatments from 1-12 week

	Treatments				
Week	T1	T2	T3	T4	T5
1	25±2.603	25±2.028	29±3.756	26±2.028	26±2.603
2	52±1.155^{a}	55±0.577^{a}	51.667±0.333^{a}	53±2.082^{a}	46.333±0.882^{b}
3	66.333±0.882^{d}	67.333±0.333^{d}	75±0.577^{b}	78.667±0.333^{a}	69.667±0.333^{c}
4	98.333±2.333^{c}	151.667±1.764^{a}	99±0.577^{c}	110.667±1.202^{b}	105.333±2.603^{b}
5	66.333±3.283^{c}	66±0.577^{c}	103.667±3.756^{b}	137±1.528^{a}	60±0.577^{c}
6	155.667±4.41^{d}	190±3.464^{c}	249±0.577^{a}	155.667±4.055^{d}	207.667±2.603^{b}
7	218±2.082^{b}	226.333±0.882^{a}	130±0.577^{d}	183.667±0.882^{c}	179.666±1.856^{c}
8	152.333±4.667^{b}	127.667±4.055^{c}	147±5.774^{b}	152.333±4.91^{b}	180.667±2.728^{a}
9	171.667±0.882^{c}	150.333±2.333^{d}	226±1.732^{a}	167±1.732^{c}	192.667±2.603^{b}
10	124±1.155^{d}	189±3.464^{a}	181.667±3.18^{b}	163.333±0.333^{c}	159±1.155^{c}
11	125.333±0.882^{c}	145±2.309^{b}	145.667±2.333^{b}	176.667±1.453^{a}	180.667±0.667^{a}
12	100±0.577^{e}	245.333±2.028^{a}	127.333±0.667^{d}	143±2.646^{c}	198.333±2.646^{b}
Total	1355±20.218^{d}	1638.667±12.741^{a}	1565±12.991^{bc}	1547±11.289^{c}	1606±8.95^{b}

Mean values with common superscript in row differ significantly (p<0.01)

Table 6: Mean (±S.E.) females weight gain (g/bird) for control and partial uropygialectomy treatments from 1-12 week

	Treatments				
Week	T1	T2	T3	T4	T5
1	25±2.887	25±2.887	29±2.887	26±2.887	26±2.887
2	50±5.196	54±0.577	52±2.887	49±4.933	50±2.309
3	66.667±3.18	68.333±0.882	66.333±2.028	62.333±3.756	65±1.732
4	99.333±7.219^{b}	151±2.309^{a}	107±5.774^{b}	110±5.508^{b}	99.667±5.207^{b}
5	68±0.577^{c}	65.667±2.028^{c}	103±1.528^{a}	69.6667±0.333^{c}	76±1.528^{b}
6	125±1^{b}	101.333±0.333^{d}	100.333±0.882^{d}	140±0.577^{a}	104.333±0.33^{c}
7	33.167±4.933^{e}	119.333±0.333^{c}	52±3.48^{d}	141.667±3.48^{b}	196.833±1.732^{a}
8	121.167±0.882^{b}	96±2.963^{d}	107.667±0.882^{c}	109.333±1.202^{c}	129.833±0.667^{a}
9	91.333±1.453^{d}	114.333±2.963^{c}	89.667±0.882^{d}	137±1.155^{a}	128.333±0.667^{b}
10	99.667±3.528^{bc}	104.333±1.202^{b}	96.333±2.906^{cd}	121±0.577^{a}	89.667±1.202^{d}
11	61.667±1.202^{c}	108.667±1.764^{a}	84.667±1.764^{b}	80.333±2.603^{b}	54±4.041^{c}
12	60±2.082^{d}	146±5.196^{a}	56.333±2.333^{d}	107.667±2.028^{c}	129±0.577^{b}
Total	901±15.885^{c}	1154±8.66^{a}	944.333±11.552^{b}	1154±12.124^{a}	1148.667±9.821^{a}

Mean values with common superscript in row differ significantly (p<0.01)

Table 7: Mean (±S.E.) males feed conversion ratio for control and partial uropygialectomy treatments from 1-12 week

	Treatments				
Week	T1	T2	T3	T4	T5
1	2.213±0.077	2.293±0.078	1.977±0.167	2.256±0.06	1.91±0.1
2	2.397±0.009^{a}	1.721±0.042^{c}	1.961±0.051^{b}	2.365±0.066^{a}	2.273±0.041^{a}
3	2.397±0.072^{b}	2.045±0.054^{c}	2.058±0.036^{c}	2.22±0.068^{bc}	2.593±0.065^{a}
4	1.99±0.01^{a}	1.301±0.014^{c}	1.879±0.027^{b}	1.837±0.02^{b}	1.94±0.016^{a}
5	3.487±0.0.086^{c}	4.172±0.076^{a}	1.691±0.01^{d}	1.572±0.066^{d}	3.822±0.013^{b}
6	2.535±0.015^{b}	2.623±0.025^{a}	1.806±0.025^{e}	2.392±0.02^{c}	1.947±0.005^{d}
7	2.226±0.073^{d}	2.277±0.018^{d}	3.844±0.058^{a}	2.552±0.063^{c}	2.835±0.073^{b}
8	2.939±0.017^{c}	3.606±0.089^{a}	3.304±0.056^{b}	2.755±0.019^{d}	2.504±0.015^{e}
9	2.909±0.059^{b}	3.548±0.088^{a}	2.435±0.056^{d}	2.735±0.015^{c}	2.109±0.012^{e}
10	3.562±0.072^{a}	2.543±0.004^{c}	2.7±0.012^{c}	2.935±0.074^{b}	2.979±0.089^{b}
11	4.266±0.095^{a}	3.747±0.122^{b}	4.048±0.165^{ab}	3.313±0.04^{c}	3.208±0.071^{c}
12	5.073±0.124^{a}	2.122±0.025^{e}	4.542±0.137^{b}	3.445±0.149^{c}	2.561±0.093^{d}
Total	3.009±0.039^{a}	2.633±0.017^{c}	2.759±0.037^{b}	2.619±0.04^{c}	2.555±0.037^{c}

Mean values with common superscript in row differ significantly (p<0.01)

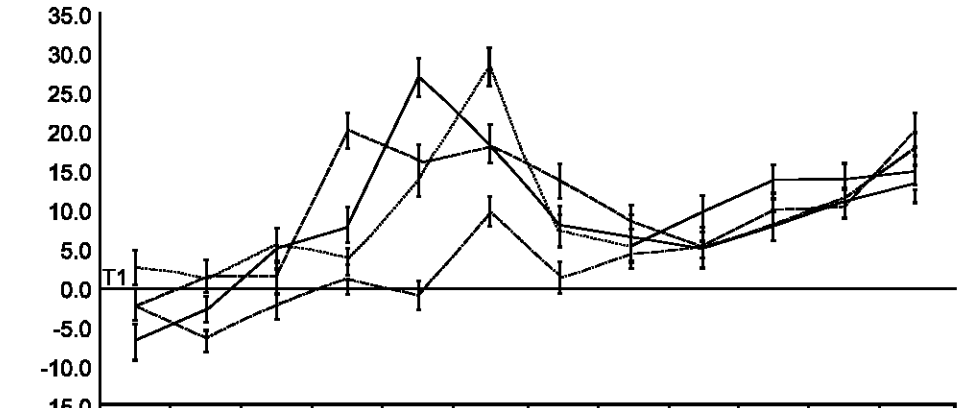
have happened during the trial period. That agree with Jacob (1976); Chen *et al*. (2003) whom considering the physiological role of the uropygial gland, it appears that the gland is not necessarily present in all groups of birds. This fact, observed in a number of species, together with the lack of a clear-cut ecological correspondence suggests that, when present, the function of the gland may be diverse but not essential. In this regard, it is interesting that the extirpation of the gland was not dangers on survival of goslings, hens and passerine birds.

The results of present study improve that the removing of uropygial gland has highly significantly effect on production performance of Akar Putra chicken concerning: body weight, weight gain, feed intake and feed conversion ratio. Figure 1 shows variation ratio curves of the average males' body weight for all groups which were within normal limits in the first few weeks before proceeding PU operation. After PU, noticeable significantly increasing in the males' body weight rates for PU treatments were observed. In the 2-3 subsequent weeks these rates were a gradually decreased with

Table 8: Mean (±S.E.) females feed conversion ratio for control and partial uropygialectomy treatments from 1-12 week

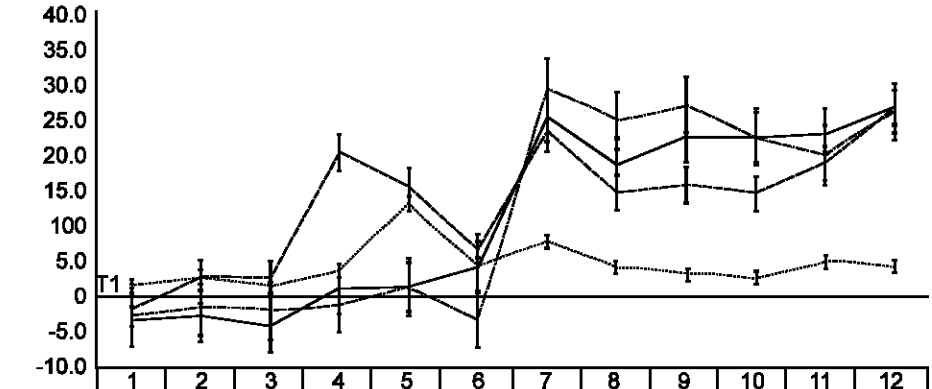
	Treatments				
Week	T1	T2	T3	T4	T5
1	2.333±0.393	2.293±0.388	1.943±0.322	2.256±0.388	1.936±0.33
2	1.633±0.062^{b}	1.765±0.029^{b}	1.949±0.015^{b}	2.558±0.196^{a}	2.727±0.04^{a}
3	1.885±0.2^{b}	2.01±0.046^{b}	2.327±0.162^{ab}	2.797±0.258^{a}	2.774±0.15^{a}
4	1.99±0.104^{b}	1.309±0.005^{d}	1.754±0.052^{c}	1.849±0.048^{bc}	2.381±0.087^{a}
5	3.402±0.152^{b}	4.198±0.071^{a}	1.702±0.036^{d}	3.091±0.091^{c}	3.452±0.025^{b}
6	2.213±0.105^{a}	1.632±0.064^{b}	1.96±0.092^{a}	2.005±0.054^{a}	1.422±0.065^{b}
7	7.518±0.336^{a}	1.704±0.063^{c}	4.064±0.024^{b}	1.369±0.041^{c}	0.774±0.04^{d}
8	2.396±0.105^{a}	2.285±0.028^{a}	1.464±0.109^{b}	2.445±0.099^{a}	2.316±0.070^{a}
9	2.931±0.179^{a}	2.096±0.133^{b}	2.071±0.152^{b}	2.747±0.095^{a}	2.117±0.0.82^{b}
10	3.599±0.036^{a}	2.045±0.115^{c}	2.111±0.066^{c}	2.939±0.117^{b}	2.967±0.15^{b}
11	4.238±0.161^{a}	2.224±0.074^{c}	2.543±0.232^{c}	3.427±0.052^{b}	3.198±0.01^{b}
12	5.156±0.1^{a}	1.763±0.026^{e}	3.083±0.142^{c}	3.43±0.067^{b}	2.54±0.092^{d}
Total	3.006±0.083^{a}	1.996±0.057^{c}	2.138±0.091^{c}	2.509±0.065^{b}	2.182±0.062^{c}

Mean values with common superscript in row differ significantly ($p<0.01$). Mean values at week 3 differ significantly ($p<0.05$)



	1	2	3	4	5	6	7	8	9	10	11	12
T2	-2.2	1.5	1.5	20.2	16.2	18.0	13.7	8.5	5.0	10.1	10.6	20.3
T3	-2.7	1.2	5.6	3.8	14.0	28.3	7.4	5.5	9.8	13.7	14.0	14.9
T4	-6.6	-2.7	5.2	7.8	26.9	18.5	8.1	6.7	5.1	8.0	11.2	13.4
T5	-2.2	-6.2	-2.0	1.2	-0.9	9.8	1.5	4.5	5.8	8.2	11.6	17.9

Fig. 1: Variation ratio curves of males' body weight of UP treatments then control group from 1-12 week



	1	2	3	4	5	6	7	8	9	10	11	12
T2	-1.6	2.7	2.6	20.3	15.6	6.4	23.1	14.6	16.0	14.6	18.9	26.9
T3	1.6	2.7	1.5	3.7	13.1	4.4	7.8	4.2	3.4	2.6	5.0	4.3
T4	-3.3	-2.7	-4.1	1.2	1.4	4.3	25.5	18.7	22.7	22.5	23.1	26.7
T5	-2.7	-1.5	-1.9	-1.1	1.4	-3.3	29.4	25.1	27.0	22.5	20.1	26.1

Fig. 2: Variation ratio curves of females' body weight of UP treatments then control group from 1-12 week

retaining superiority of PU treatments than control group. Then, the curve of males' body weight of PU treatments re-raised from week 10 till week 12. Figure 2 also shows remarkable increasing in the variation ratio curves of females' body weight in PU treatments after removing the gland. At week 6, decrease in the females' body weight rate curve of PU treatments was occurred and fallowed by very noticeable raising in the curve of these rates especially in T2, T4 and T5. These raising continued till week 12. These results agree with Al-Hassani *et al*. (2008) when they tested the effect of removing uropygial gland (uropygialectomy) on same semen trails of broiler breeder males and they got highly significantly effects of removing the gland on all semen tested trails. Also they recommended that uropygialectomy could be used as a tool to improve fertility in broiler breeder aged between 38-54 weeks. While, Montalti *et al*. (1998, 2000); Moyer *et al*. (2003b) supported an idea that surgical removing of uropygial gland is not necessarily have a positive impact on the production performance for all birds' species. They gave evidence that the surgical removal of the uropygial gland in Columba livia did not affect the behavior, survival and body weight gain and feeding rates, over a two-month period. In this regard, Montalti *et al*. (2006) measured several biochemical parameters in relation to gland physiology comparing control specimens with gland-removed specimens. No differences were found in serum levels of cholesterol, total lipids and calcium after 32-120 days. Thus, no alteration in two basic biochemical parameters associated with the metabolism of lipids and in a critical parameter related to mineral homeostasis, was noted four months after ablation of the gland. These results suggest that the uropygial gland may not relate, at least physiologically, to the homeostasis of lipids or to the regulation of calcium metabolism.

Conclusion and suggestion: Based on the research result and discussion, it can be concluded that stop the function of uropygial gland by partial surgical removal technique caused improvement in the production performance of Akar Putra chicken significantly. It is assumed that the oil of uropygial gland had positive impact on the body performance after removing the gland. Based on the conclusion the research team creates several suggestions as follows:

1: Developing the research about removing uropygial gland at the first week old chicks so that it can increase the effect of the uropygial gland oil on the body performance
2: Developing the research about the oil of uropygial gland biochemistry so that it can be identified exactly the mechanism of enhancing the body performance after removing the gland

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