Productivity of Local Pigeon Fed with Cafetaria Method in Intensive Rearing

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ABSTRACT

This experiment has been done to evaluate productivity of local pigeon fed with corn or commercial feed using cafeteria method in pre-laying, hatching and production (squab suckling) phases in intensive rearing. There are 68 couples of local pigeon used in this experiment, and each couple is placed in individual cages. The results indicate that average of egg production is 1.8 eggs/couple/period, average of egg weight is 17.7 g, fertility is 96.6%, hatching rate is 77%, embryo mortality rate is 23%, interval period from laying up to hatching and suckling is 51 days, 31.4 days for period of hatching, and 17.6 days for period without (non) hatching and suckling. Each couple of local pigeon need 73.04 g feed/day in pre-laying phase, 60.38 g feed/day in hatching phase, and 91.75 g feed/day in suckling two squabs; these are based on the total feed consumptions of corn and commercial feed. During hatching phase, corn consumption is the same as commercial feed consumption in week I, II and III. During non-hatching phase, corn consumption differs from that of commercial feed consumption. During this phase, corn consumptions are the same in all weeks (I=II=III=IV); commercial feed consumption at week II is the lowest, but there is no different in commercial feed consumption at the other weeks (II<I=II=III). During squab suckling phase, there are differences in pattern of corn consumption from that of commercial feed consumption; corn consumption increases from week I up to week III (I<II<III=IV), commercial feed consumption at week I-III are lower than that at week IV (I=II=III<IV). In all phases, corn is more preferred than commercial feed, but the commercial feed can still be given and the best ratio between corn and the commercial feed is 60:40%. Squab weight increases up to the 4^{th} week, then decrease in the 5^{th} week. Growth rate is the highest at the 1^{st} week, but then decreases from the 2^{nd} up to the 5^{th} weeks with the negative growth rate occurs at the 5^{th} week. Squab growth rate follows a quadratic pattern with this formula: $Y = 11.2 + 121t - 13.3t^2$. Feed conversion ratio up to the age of 4^{th} week is 5.7. It is concluded that squab selection on the basis of slaughter weight can be done at the 4^{th} week old.

Key words: pigeon, productivity, consumption, squab growth rate, and cafeteria feeding

INTRODUCTION

Commonly, the owner of pigeon feed their pigeons just with corn or other grains such as rice grain. Corn or other grains do not meet pigeon nutrient requirement for reproduction. However, there is limited information of feed requirement of local pigeon.

Feeds that are suitable with the pigeon needs in intensive rearing are necessary to obtain their productivity as expected. It is expected that the pigeon lay 1-3 eggs per period with average is 2 eggs per period (Levi, 1945). Cock and hen hatch the eggs with hatching time allocation for hen are longer than the cock. The first egg hatch 17-18 hour after the eggs are laid, and the second egg hatch 48 h after the first eggs are laid (Blakely and Bade, 1989). Hen will lay again after the squab reaching the age of 2 weeks. Both cock and hen suck their squab.

The pigeon is able to consume simple feeds consisting of grains and a little good grit; the pigeon also needed clean water (Anggorodi, 1995). Drevjany (2001) also reports that pigeon could be fed with feed that was made up of crumble ration or mixed of grains, minerals, grit and water. Among the feeds, pigeon liked grains such as corn, soya bean, peanut and wheat grain (Alwazzan, 2000). A good feed for pigeon contains nutrient composition as follows: 13.5% crude protein, 65% carbohydrate, 3.5% fibre and 3.0% fat; minerals, vitamins and grit also need to be added.

There are no pigeon feeds available in poultry shop that is produced commercially. A mixed of corn and broiler diet can be given to the pigeon during production phase. Those feeds are

expected to be able to meet the nutrient requirement for the pigeons in intensive rearing. The commercial feeds given to the pigeon is also needed to increase the productivity of pigeon and to replace the use of grains such as corn. The pattern of pigeon consumption for those feeds needs to be observed as well as the parental productivity and squab growth per week. This information is important for rearing the pigeons especially those in intensive rearing.

Therefore, the purpose of this experiment is to study the effects of giving feeds consisting of corn and commercial broiler diet in cafeteria feeding on pigeon productivity, consumption patterns of pigeons in pre-laying, hatching and suckling phases, and squab growth in intensive rearing. The advantage of this experiment is to provide information to pigeon owner and hobbies about pigeon feeds that are given in cafeteria feeding in intensive feeding.

MATERIALS AND METHODS

This experiment used 68 couples of adult local pigeons (*Columba livia*). Each couple of pigeon was placed in a cage (60x50x50 cm^3) that was made up of wire (1.2x1.2 cm^2). Feeds and water troughs were placed in each cage. As the pigeon was fed with cafeteria feeding, there were two feed troughs available, one for corn and the other for commercial broiler diet. Feeds and water were given *ad libitum*.

Variables that were observed included parental productivity, feed consumption for each kind of feed in different phase and squab growth that were recorded every week. The data were analysed descriptively; however, data for feed consumption was examined by T-test (Steel and Torrie, 1995).

RESULTS AND DISCUSSION

Pigeon productivity

Productivity of local pigeon is shown in Table 1, the productivity data included productivity characteristics and parental reproductions. There are 12 out of 68 couples of pigeon that do not hatch. The percentages of pigeon that hatch are 82.4%. This hatching variation is due to genetic factor and there is no selection for good hatching characteristic from the maternal ability. Hatching variation is also affected by other factors, such as the pigeons do not like the provided nest although they lay the eggs. Commonly, a pigeon lays two eggs per period of laying. In this experiment, the average of egg production per couple is 1-3 eggs. It is observed in this experiment that there are three hens laying one egg, and one hen laying three eggs.

This result is in agreement with that was obtained by Levi (1945). Egg production is influenced by factors such as poultry instinct to adapt to the environment; on the other hand, poultry laying capacity is determined by genetic capability and environment (Rasyaf, 1985). Egg weight is about 12-20 g with the average is 17.7 $\pm$ 1.6 g and coefficient variation is 90% in this experiment. Ensminger (1992) indicates that poultry egg weight is influenced by genetic, body weight and age. Egg numbers that have been produced in a year is affected by clutch, feed protein content, feed and water, temperature, cage type and diseases. The heritability off egg weight is 0.6 (Noor, 2000), and 0.4-0.85 (Etches, 1996). The egg weight has high heritability. This means that individual selection for selecting parents having big eggs is effective for increasing pigeon egg weight.

Pigeon egg shape, egg round with shape index, is 75.5 $\pm$ 1.6% with coefficient of variation is 7.5%. In this experiment, the egg shape is almost identical. The colour of pigeon egg shell is also identical which is white.

Fertility and hatching capacity, respectively, are 92.4% and 77% in this expe-riment. This means that there is small percentage of unfertilized eggs or not fertilized eggs (7.6%). However, not all the fertile eggs are hatched to be squab. This indicates that there were 23% of fertile eggs died during hatching phase.

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Pause is interval laying time in one period with the next laying period. The average of pause in non-hatching period in this experiment is 17.6 days, pause in hatching period is 34.1 days, and totally the pause from laying, hatching and up to suckling the squab is 51 days.

Tabel 1. Productivity of local pigeon

Variables	Mean ± sd	Range	Coefficient of Variation (%)
Maternal ability (%)	82.4	-	-
Egg weight (g)	17.7 ± 1.6	12-20	9.0
Egg production (egg)	1.8 ± 0.6	1-3	33.0
Shape index (%)	75.7 ± 5.6	-	7.5
Fertility (%)	92.5	-	-
Hatchability (%)	77.0	-	-
Day old pigeon (g)	14.0 ± 1.2	10.9-16.2	8.0
Embryo mortality rate (%)	23.0	-	-
Laying interval period (days)			
1. hatching and suckling	51.0	-	-
2. hatching only	34.1	-	-
3. non hatching	17.6	-	-

Table 2. Feed consumption per couple

Phase	Feed	Week				Week				
		1	2	3	4	1	2	3	4	Average
		g/week				g/day				
Not hatching	Corn	283	267	321	323	40.43	38.14	45.86	46.14	42.64
	Commercial feed	233	151	228	239	33.29	21.57	32.57	34.14	30.39
	T-test	ns	**	**	*	ns	**	**	*	
	Corn + commercial feed	516	418	549	562	73.71	59.71	78.43	80.29	73.04
Hatching	Corn	236	226	219		33.71	32.29	31.29		32.43
	Commercial feed	168	148	171		24.00	21.14	24.43		23.28
	T-test	**	**	**		**	**	**		
	Corn + commercial feed	404	474	390		57.71	67.71	55.71		60.38
Suckling (2 squabs)	Corn	331	365	383	397	47.29	52.14	54.71	56.71	52.71
	Commercial feed	248	261	288	296	35.43	37.29	41.14	42.29	39.04
	T-test	**	**	**	**	**	**	**	**	
	Corn + commercial feed	579	626	671	693	82.71	89.43	95.86	99.0	91.75

Table 3. Body weight and growth of squab

Week	Body weight (g/bird)		Coefficient of variation (%)	Period between week	Growth rate (%)*
	Means ± sd	Range			
0 (hatched)	14.02±1.20	10.9- 16.2	8.56		
I	112.22±27.98	60.0- 80.0	24.93	0-I	155.58
II	202.77±47.51	93.0-306.0	23.43	I-II	62.57
III	256.16± 8.24	192.0-355.0	22.74	II-III	23.27
IV	290.40±27.98	170.0-340.0	9.63	III-IV	16.92
V	282.17±44.43	135.5-340.0	15.74	IV-V	-2.87

*) Growth rate is calculated based on this formula : $[(W_2-W_1)/0.5(W_1+W_2)]x100\%$, W=body weight of k-th. measurement (Bokhari, 2002).

Pigeon Feed Consumption

Pigeon feed consumption during hatching, suckling and pre-laying in this experiment is divided into two types of feeds that are given, i.e. corn and commercial broiler diet. Feed pattern for each of feed types is useful for pigeon breeding. Pigeon consumption of corn and commercial broiler feed is shown in Table 2. During the phase of not hatching (non-hatching phase), the amount of corn consumed is 283 g/couple/week in week I. Corn consumption decreases in week II reaching 267 g; this corn consumption increases to 321 g in week III, but there is no significant increase in week IV (323 g). These patterns are also observed when commercial broiler feed is consumed by the pigeon and when the total consumption is calculated. However, the corn consumption is higher than that of commercial feed. Comparison between corn consumption and commercial feed consumption indicates that the difference is not significant in week I. There are significant differences observed in week II and III ($P<0.01$) and week IV ($P<0.05$). This means that corn consumption produces more effect than that of commercial feed and this could be due to the form of corn, i.e. grains vs crumble in commercial feed.

During the phase of hatching, corn consumption reduces linearly from 236 g in week I to 226 g in week II ant to 219 g in week III. This pattern differs from that of commercial feed consumption which tends to follow quadratic pattern; the consumption is 168 g in week I, decrease to 148 g in week II, and then increases up to 171 g in week III. When the corn consumption is added with that of commercial feed, the total consumption also has quadratic pattern, but in the reverse pattern of commercial feed consumption. This means that the corn consumption produces a greater effect than that of commercial feed. The ratio of corn consumption to commercial feed consumption is 60 : 40% in hatching phase.

In suckling phase, a hen with two squabs consumed corn at 331 g at week I which increases linearly to 365, 383 and 397 g, respectively at weeks II, III and IV. A similar pattern to corn consumption also occurs when commercial feed is given. These linear increases in corn and commercial feed also cause linear increases in total consumption of corn and commercial feed for week I up to week IV. Differences between com and commercial feed are significant for week I up to week IV. The highest consumption of commercial feed in week I is due to requirement of squab to smooth feed that contains high nutrient concentration. This can be provided by milk crop produced by the parents, and by feeds eaten by the parents; feeds in bigger size than commercial feed, such as corn, can only be eaten by the squabs after 6 days old in this experiment. Mire and Plate (2009) indicate that pigeon fan can be fed with 15% protein (pellet) or a mixed of grains and layer hen feed consisting of 16-17% protein.

This experiment indicates that the average of feed consumption in non hatching phase is 73.04 g/couple/day, in hatching phase is 60.38 g/couple/day and in suckling phase is 91.75 g/couple/day.

Squab body weight gain and feed conversion ratio

Table 3. indicates body weight of squabs. Squabs grow quickly during the first up to third weeks, growth rates then decrease until the squab is weaned at 35 days old. High growth rate occurs during week I – II, growth rates decrease linearly with the lowest growth rates with negative result occurs at week V.

Table 4. Feed conversion ratio

Week	Feed conversion ratio
I	2.95
II	3.42
III	6.30
IV	10.16

This experiment also indicates that squab growth curve from hatching up to weaning in 35 days old followed quadratic pattern, i.e. $Y = 11.2 + 121\ t - 13.3\ t^2$; Y = weight and t = time (age). Figure 1. shows that the highest growth rate occurs until the squab reaching 14 days old, then decrease with negative result after 28 days. The results of squab carcass indicate that selection should be done when the squabs reaching 21-28 days old and before the squab is weaned at 35 days. This is also because of growth rate is low, but the squab weight is the highest in the fourth week, it then decreases in fifth week.

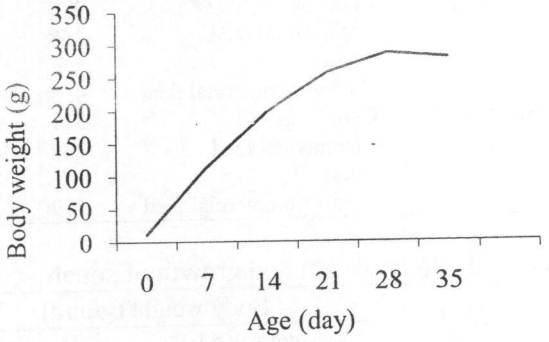

Figure 1. Body Weight of Squab from 0 – 35 Days

Feed conversion rate for squab is high. This is because of high growth rate occurs during the first three weeks. It then decreases at the fourth and fifth weeks due to reductions in growth rate of squab (Table 4). This indicates that feed efficiency decreases with the increases in age.

CONCLUSIONS

There are variations in egg production which is about 1-3 egg/couple/period. Fertility is 96.9% with hatching capacity 77% selection for good iparental is good to increase hatching capacity and fertility. Each couple of local pigeon need 73.04 g feed/day in pre-laying phase, 60.38 g feed/day in hatching phase, and 91.75 g feed/day in suckling two squabs; these are based on the total feed consumptions of corn and commercial feed. The ratio between corn and commercial feed is 60:40%.

Weaning weight of squab in the 4th week is the highest, i.e. 290.4 g; growth rate reduces at the 5th week; the growth rate followed quadratic pattern. Slaughter weight selection can be done at four weeks old.

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Carcass and Beef Characteristic from Brahman Cross Steers Fattened in Feedlot Prepared for Traditional Market

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ABSTRACT

Beef cattle feedlot is a fast growing industry in Indonesia. The industry supplies beef for particular market (hotel, restaurant and institution) as well as traditional market. This study was aimed to examine carcass and beef characteristics from Brahman Cross (BX) steers slaughtered at different slaughter weight, and also fat thickness categories prepared for traditional market. The study involved 40 heads of feeder cattle of Brahman Cross steer fattened on concentrate based ration and slaughtered at four slaughter weight categories (301-350 kg, 351-400 kg, 401-450 kg and 451-500 kg), and three fat thickness categories (2.5-4.5 mm, 5.0-7.0 mm and 7.5-9.5 mm). The carcass characteristics observed included hot carcass weight, dressing percentage, twelfth rib fat thickness, loin eye area, estimated lean weight and percentage and estimated fat weight and percentage. The beef characteristics observed included meat tenderness, cooking loss, water holding capacity, marbling score, meat and fat colors. The experiment was set up in a completely randomized design with slaughter weight category, and also fat thickness category as the treatment. Results of the study indicated that slaughter weight category significantly ($P<0.05$) affected hot carcass weight, estimated lean and fat weights, while dressing percentage, twelfth rib fat thickness, estimated lean and fat percentages were not significantly influenced by slaughter weight category. Fat thickness category did not have significant effects on hot carcass weight, dressing percentage, rib eye area and lean weight but this fat category significantly ($P<0.05$) affected estimated lean percentage, estimated fat weight and percentage. Neither slaughtered weight nor fat thickness categories had obvious effects on beef characteristics. It was apparent that slaughter weight and fat thickness categories were not a limiting factor for beef quality traits but the carcass productivity traits.

Key words: Brahman cross steer, fattening, carcass and beef characteristics, traditional market

INTRODUCTION

Local cattle have been primarily supplying beef for traditional market. The high demand for beef has stimulated the fast growing feedlot industry using imported feeder cattle from Australia, which amounted to 400,000 heads annually (Direktorat Jenderal Peternakan, 2008). Cattle feedlot industry in Indonesia has grown rapidly in order to fulfill quality beef for supplying particular market such as hotels, restaurant and institution. Recently, the feedlot industry also supplies traditional market since there was a shortage of local cattle. Halomoan *et al.* (2001) reported finished cattle at lighter slaughter weight, approximately 372 kg, for traditional market and heavier slaughter weight, approximately 511 kg for particular market. Carcass weight and fat thickness have been identified as indictors of a carcass' productive traits (Johnson *et al.*, 1997; Priyanto *et al.*, 1997; Priyanto *et al.*, 1999; Hafid and Priyanto, 2006). The two factors have long been used as a basis of beef carcass evaluation (Kempster *et al.*, 1982). The following study examined the effects of slaughter weight and fat thickness categories on carcass and beef characteristics from Brahman Cross (BX) steers fattened in feedlot.

MATERIALS AND METHODS

Cattle and Procedures

The study involved 40 heads of 2 year-old Brahman Cross steers with initial live-weight averaging 220 - 335 kg. They were fattened on concentrate based ration containing 14 % crude protein and 75 % TDN for approximately two months. The steers were prepared for traditional market and sequentially slaughtered at four