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EFFECT OF FEEDING REGIME AND CASTRATION TIMINGS ON THE PRODUCTION PERFORMANCE OF FATTENER PIGS

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ABSTRACT: Study was conducted to assess the effect of feeding regime and castration timings on the production performance of fattener pigs. Feed conversion ratio, average daily weight gain, final weight including the cost-benefit analysis of fattener pigs reared under farm conditions with similar feeding and management practices were studied. Twenty-two piglets of same age, uniform size with equal sex ratio on the day of farrowing were included for the study. The animals were randomly assigned to Group A and Group B. The pigs in Group A were fed once in the morning, and pigs in Group B were fed twice in a day as per usual farm practice for 280 days. The birth weights were taken as an initial weight for all animals. All the animals were weighed before feeding in the morning on a fortnightly basis using portable digital weighing balance until weaning. Thereafter, the pigs from weaning until termination of the trial were weighed using electronic weighing scale. The male pigs in each group were castrated at 3 different stages; 14, 30 and 60 days after birth. Two-way analysis using ANOVA was administered for the data analysis. A significant difference was not observed in the overall mean final weights between the two study groups. The average daily weight gain and feed conversion ratio for pigs in group A and B were 0.339 g & 0.346 g and 4.02 and 3.65, respectively. The mean final weight of pigs castrated at 14, 30 and 60 days were 93.8 kg, 99.02 and 97.15 kg irrespective of group and the result did not differ significantly ($p = 0.771$). However, the study showed a slightly higher final weight gains in female (98.5 kg) when compared to male (96.5 kg) pigs irrespective of the group. The cost-benefit-analysis although not significant, revealed higher net-income by 46.62% in Group B than Group A. The study concludes that feeding frequency and castration timing does not affect the overall performance of fatteners pigs reared under similar management practices and environment condition.

Keywords: Average daily gain; castration; feed conversion ratio; fatteners.

1. INTRODUCTION

Livestock species plays a vital role in socio-cultural and economic wellbeing of rural households (Bettencourt et al. 2015). Livestock production is an important component of agricultural economy of most developing countries (Sugiyama et al. 2003). Livestock ownership currently supports and sustains the livelihood of rural poor who depend partially or fully on livestock for their income and livelihood subsistence (Steinfeld 2003).

The small and medium sized livestock particularly pigs are a viable and profitable enterprise that is commonly reared by small holder farming communities. Pigs require lesser investment compared to other livestock species as they are prolific breeder and are good feed to meat converter (Klaas 2011). Pig farming adds value to local food waste and crop residue, and contributes

to sustainable local agriculture by local mineral cycle and removing waste (Oosting et al. 2014).

In Bhutan, livestock contributes about 7% of the national Gross Domestic Product (GDP) and 22 % of rural income (Ministry of Agriculture 2009). Pig alone constitutes about 1.1% of the total livestock population in Bhutan (Department of Livestock 2019). The pig farming and the fattening practices is a common phenomenon in most of the potential pockets in the country since time immemorial. There is a system of feeding pigs in the farmers' field twice a day for entire fattening period. On the other hand, it is common practice to castrate animals prior to slaughter for better performance and the management. The castration of fattener pigs is expected to reduce or remove boar taint in pork. However, until date, there are no science-based evidences to make any inferences and recommendation on these parameters for implementation in the field. Thus, this study was conducted to assess the effect of feeding regime and castration timing on performance of fattener pigs in terms of Feed Conversion Ratio (FCR), average daily weight gain, final carcass weight and overall cost-benefit-analysis for fattening the pigs.

2. MATERIALS AND METHODS

2.1 Study area

The study was conducted in government piggery farm between September, 2019 and May, 2020. The geo-position of the farm is 26° 52' N and 90° 29'E and lies at an elevation of 300 masl (DoL 2019). The average environmental temperature of the study area is 32 degree Celsius in summer (May to July) and 21.8 degrees Celsius in winter (November to January) with average Relative Humidity (RH) of 86.5% and 62.42% in summer and winter, respectively (NPiRDC 2018). The average temperature and relative humidity recorded during the study period was 26.63 degree Celsius and 62.27 %, respectively.

2.2 Experimental design

The piglets of same age and uniform size with equal sex ratio born from colour breed sows (Saddle back) were selected and provided with sample identification by ear notching on the day of farrowing. A total of 22 piglets consisting of 12 males and 10 females were selected for the study. All sample identities were fed to online system (www.randomresult.com/ticket.php) to randomly assign into two different groups 'Group A' and 'Group B'. Similar procedure was followed for male pigs to randomly assign them into different stages of castration timings. The animals in Group A were fed once in the morning with the standard daily feed requirement. Animals in Group B were fed twice (morning and evening) with the same standard daily feed requirement. Two piglets each from both the groups were aseptically castrated on 14, 30 and 60 days after the birth.

2.3 Weight measurement and data recording

The birth weights recorded on the day of farrowing were taken as initial weights for all animals. The animals were weighed before feeding in the morning on a fortnightly basis from the start to termination of the experiment. All the experimental piglets were measured using portable digital weighing balance (CAMRY-Model: EL10/EL11) until weaning. Thereafter, the pigs were individually weighed using electronic weighing scale (Caliber platform scale, Model CSP 300K) until the termination of the experiment. A weigh crate was used to hold the pigs during weight measurement.

2.4 Castration

All male pigs were castrated at three different stages after birth. Two pigs each from 'Group A' and 'Group B' were castrated at 14, 30 and 60 days of age respectively. Post-operative care of animals was done on regular basis during routine farm activities.

2.5 Animal feeding

The animals in 'Group A' and 'Group B' were fed with commercial Budhi Maya Gurung (BMG) feeds as per the standard feeding regime. The animals in 'Group A' were fed once daily in the morning with the quantity of the daily feed requirement. In 'Group B' the quantity of daily feed requirement was divided into two parts and animals were fed twice, once in the morning and in the evening. The daily feed consumption was recorded for both the groups separately. However, the animals in Group A were fed in the ratio of 70:30 (morning: evening) during the first week to prevent digestive complications. The starter feed was fed to all animals until they attained 25 kg

body weight and the grower feed was fed to pigs from 25kg until pigs attained body weight of 50 kg. The finisher feed was fed to pigs from 50 kg till the termination of the experiment. The amount of feed fed to the pigs was 5% of body weight until the pigs attained 50kg. Thereafter, the amount of feed was calculated based on the formula; 2+(X-50) x 2% until termination of the experiment where 'X' stands for present live weight of animal (Choden J, personal communication, 11th June, 2019).

2.6 Data compilation and analysis

A data recording format was developed in excel sheet to compile weight measurement records and feed consumptions for the entire study period. The compiled data were subsequently imported to Statistical Package for Social Sciences (SPSS) version 23.0 for analysis. The data were analyzed using Two-way Anova and descriptive statistics. The relevant information generated from the analysis was accordingly reported as graphs, figures and tables.

3. RESULTS AND DISCUSSIONS

3.1 Initial body weight and its overall performance

The mean initial birth weights of experimental pigs in Group A and B were 1.64 ± .33 kg and 1.79 ± .46 kg. A significant difference was not observed between the groups for the initial weights of animals (p = .391). The final body weight at 280 days of fattening period was 96.54 kg and 98.45 kg for Group A and Group B respectively (Figure 1). Although, the final weight gain was higher in pigs fed twice a day, a significant difference was not observed (p = .558) at 95% confidence interval.

The present study indicated that it is not beneficial to feed the fattening pigs twice a day. It was reported that the average market weight of the pigs was 79.0 kg indicating a high influence of the production system practiced by farmers (Machine et al. 2010). The current study is also in line with the findings of (Anke 2004; Penjor et al. 2019; Garitano et al. 2013) who reported average final live weight of 114 kg, 117.27 kg and 125 kg respectively for the fatteners.

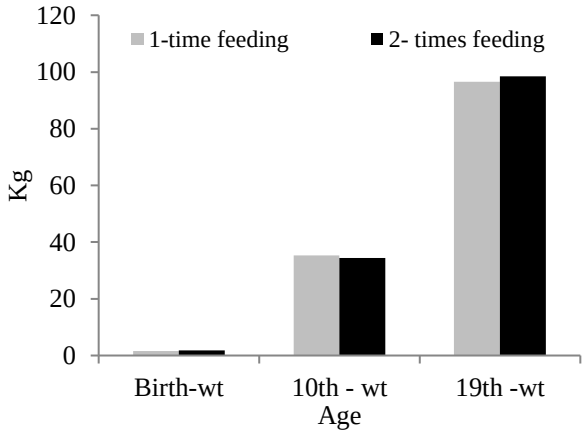

Figure 1: Growth performance of pigs

3.2 Stages of castration and growth weight

The mean final weight of animals recorded for the castrated pigs were 93.8 ± 7.2 kg, 99.02 ± 7.2 and 97.15 ± 7.2 kg respectively. The final weight gains of pigs did not differ significantly (p = 0.771) irrespective of age at castration. The study indicated that the stages of castration had no effect on the growth and final weight of the animals (Figure 2). The result is in line with the work of (Sri Balaji et al. 2006) who reported that there was no difference in body weight gain, feed intake and feed efficiency between castrated and uncastrated pigs.

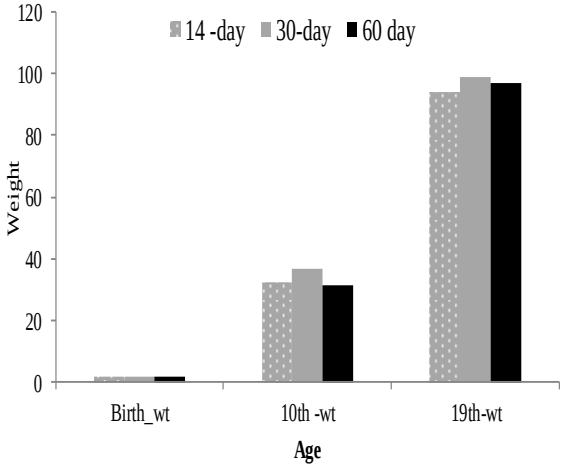

Figure 2: Performance of castration age on growth rate.

Nevertheless, it was observed that castration wound heels faster in young fattening pigs than in the older fattening pigs. This could be attributed to the aseptic surgery and cooler climatic condition of male pigs during the experimental period.

3.3 Sex and growth performance

The mean body weights of animals at measurement (M1) for male and female pigs were 4.24 kg and 4.36 kg respectively. The study indicated that there was no significant difference ($p > 0.05$) in mean body weights between male and female pigs at 14 days of the trial. However, the average final body weight was slightly higher in female (98.5 kg) when compared to male (96.5 kg) pigs (Figure 3). According to (Garitano et al. 2013) the sex had no significant influence on carcass weight, carcass yield and feed conversion efficiency. Similar findings was reported by (Stupka, Šprysl, and Pour 2018) which inferred that there was same slaughter weight of the fattening pigs irrespective of sex for animals with ad-libitum feeding. Besides, (Garitano et al. 2013) reported that sex had no significant influence on carcass weight, carcass yield and feed conversion efficiency.

3.4 Cost-benefit analysis

For the cost -benefit- analysis, only major costs such as piglets, feed and labor were included in the study. In general, two-times feeding group was more economical as compared to one time feeding and details of which are mentioned (Table 1). On 280 days of fattening, pigs were measured and sold on live weight basis. One of the pigs in Group A died in the middle of the trial period. The dressed weight of 74% with kill out percentage of 26% was considered for the purpose of calculating carcass production per pig. The cost of pork was taken as Nu.180 per kg. The cost-benefit-analysis revealed that the net-income is higher by 46.62% in Group B than Group A although there is not much difference in cost per kg meat production. This suggests that, more than one time feeding is recommended in fattening operation in the field.

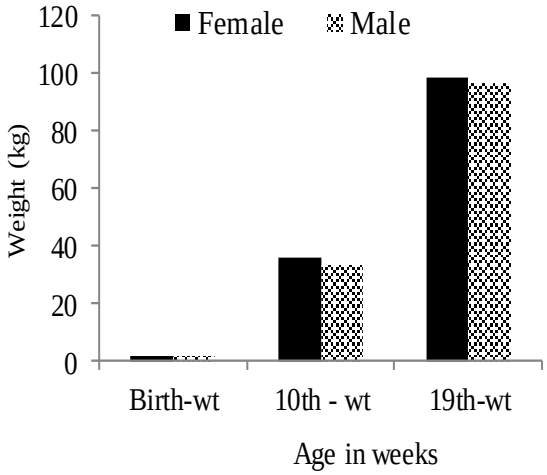

Figure 3: Growth performance among different sex

Table 1: Cost benefit analysis

Parameters	**Treatment**	
	Group A	Group B
Piglets (Nu)	22000	22000
Feeds (Nu)	119580.2	121405.1
Labor (Nu)	3675	7350
A. Total Expenses	**145255.2**	**150755.1**
Average weight gain in kg	96.54	98.45
Total pork production in kg	965.44	1083.05
Estimated carcass yield (26%)	714.43	801.46
Sales from pork (Nu)	157174.6	176221.2
B. Return	**157174.6**	**176321.2**
Cost per pig production (Nu)	14651.62	13934.28
Cost per kg meat production (Nu)	151.77	141.54
Net income in Nu. (B – A)	**11919.4**	**25566.1**

3.5 Average Daily Gain (ADG) and Feed Conversion Ratio (FCR)

The study revealed that, there was no significant difference in ADG and FCR between feeding frequency of daily once and twice feeding. The ADG and FCR recorded were 0.339kg and 0.346kg and 4.02 kg and 3.65 kg for daily once and twice feeding respectively (Table 2). In a similar study, average daily gain of nursery pigs fed with the commercial diets was higher than that of pigs fed with the forage-based and silage based diets (Carter et al. 2017). It was also reported that ADG in pigs fed with commercial feed was 0.518 kg (Tenzin et al. 2019). The immunocastrated males showed comparable feed intake, feed efficiency and growth rate (Škrlep et al. 2010).

Table 2: Average Daily Gain (ADG) and Feed Conversion Ratio (FCR) of animals

Parameters	Group A	Group B
No of animals	11	11
Average initial weight (kg)	1.64	1.7
Average final weight (kg)	96.54	98.45
ADG (g/day)	0.339	0.346
Total feed intake (kg)	3884	3951
FCR	4.02	3.65

4. CONCLUSION

Feeding regime does not necessarily affect the body weight gain in pigs when the animals are fed one time or two times in a day. Moreover, there was no significant difference in the final live weight and carcass yield in the pigs when fed once or two times a day. However, feeding animal the required daily feed requirement at one time was found unsafe especially in young age creating complication in digestive process. Castration of pigs at different stages do not impact on weight gain and final weight. The existing system of feeding twice a day and current practice of castration in the field may be continued on aseptic condition for optimum growth of pigs. For ease of handling and overall management, and also to minimize complication of castrated wound, early castration of male pigs is recommended. About nine months of fattening period is found to be the right age for marketing for better economic returns to the farmers under good management practices.

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Ethical issues and limitation of the study

The basic animal welfare related issues such as proper housing, feeding and care of the animals were addressed during the entire experimental period. Thus, there were no ethical issues in this study. It was beyond the scope of the current study to assess the right age for marketing the fattener pigs for better economic returns to the farmers which may warrant further research.

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