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Effect of surgical castration and chemical castrations (AgNO₃ and KMnO₄) on the production performance of growing finishing pigs

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Abstract

The study was carried out in 24 LWY male pigs of 2 months reared up to 8 months of age. Three treatment groups of castration namely Control or Surgical Castration (C), Treatment-1 or chemical castration using AGNO₃ (T₁) and Treatment-2 or chemical castration using KMnO₄ (T₂). Each group consist of 8 pigs and castrations were done when the animals reaches the age of 2-3 months for each of the treatment groups. The following parameters were recorded: Fortnightly bodyweight and feed intake. A highly significant ($P < 0.01$) difference was observed in the final body weight and overall ADG; and significant ($P < 0.05$) difference was observed in the overall ADFI and overall FCE of the group T₁ compared to C and T₂ group.

Keywords: LWY, castration, bodyweight, ADG, feed intake, FCE

Introduction

Mizoram is one of the states of North-East India sharing borders with Tripura, Assam and Manipur; and with the neighbouring countries of Bangladesh and Myanmar. Most household in the rural areas of Mizoram reared pigs mainly for domestic consumption and for secondary income. According to the Livestock and Veterinary Economic Survey Mizoram 2017-2018 census and Livestock and veterinary ^[1, 2], the pigs constitute the largest percentage of population for the whole of livestock population in Mizoram. Most of the fattener male pigs in Mizoram are surgically castrated boars. Castration was done when the piglet's reaches the age of 2-3 months of age to remove the boar taint, which were more pronounced upon cooking of the pork when boars were, slaughter un-castrated (Rydhmer, 2010; Bonneau *et al.*, 1992; Cohen *et al.*, 1991; Jaros *et al.*, 2005; Oliver *et al.*, 2003; Patterson, 1968; Pauly *et al.*, 2009) ^[3, 4, 5, 6, 7, 8, 9]. So, surgical castration is followed to remove the boar taint, but the drawback of this surgical castration is that it induced pain due to the incision of the skin and subsequently leading to stress of the animals, which further reduces their growth rate during the first few weeks (Prunier *et al.*, 2015; Hay *et al.*, 2003; Jaturasitha *et al.*, 2006; McGlone and Hellman, 1988; McGlone *et al.*, 1993) ^[10, 11, 12, 13, 14].

Materials and Methods

A total of 24 Large White Yorkshire (LWY) of male pigs of 2 - 3 months age were selected for this experiment. The study was performed at College of Veterinary Sciences & A.H, CAU, Selesih, Aizawl, Mizoram. The pigs were allocated into three different treatment groups (Control, T₁ & T₂) consisting of 8 pigs per group. The first group or control (C) was surgically castrated under local anaesthesia, with all the necessary post-operative treatment. Pigs in the second group or treatment one (T₁), were subjected to chemical castration using 5% silver nitrate solution, which was prepared using 5ml of silver nitrate solution + 95ml distilled water. The solution was injected @ dose of 2ml intra-testicular/testes as per the method of Kang *et al.* (1993) ^[15]. Pigs in the third group or treatment two (T₂) were subjected to chemical castration using 0.25 g potassium permanganate + 17 ml glacial acetic acid + 83 ml sterile distilled water as per the method of Giri *et al.* (2002) ^[16]. These solutions were injected @ dose of 2ml intra-testicular/testes. For T₁ and T₂, the prepared solution was injected using 24 gauge needle syringes. The needle was inserted into the testes from the caudal end of the testes to the caput of the testes.

The solution was injected into the testes while withdrawing the syringe from the testes, so that maximum solution was injected into the whole of the testes.

The individual body weight and total feed intake for each of the pigs was recorded initially at the time of the experiment and subsequently at fortnightly interval till they reach 8 month of age. Then the other production parameters: ADG and FCE were calculated out from the recorded body weights and feed intake.

Results and Discussion

The mean \pm SE fortnightly body weight (kg) of Large White Yorkshire (LWY) male pigs from 2 to 8 months (end of rearing period) of age are presented in the Table 1. Statistical

analysis revealed that the final body weight (kg) of pig in T₁ was significantly higher (100.64 \pm 0.83 kg; P <0.01) as compared to the body weight of pigs under C and T₂ group (94.00 \pm 2.01kg and 91.86 \pm 3.52 kg). The overall ADG (g) in the present study during post-weaning periods in C, T₁ and T₂ were 446.76 \pm 5.24, 483.73 \pm 4.79 and 435.56 \pm 17.95 g respectively, in which T₁ group was significantly higher than C and T₂ group. The present study was comparable to the report of Balaji *et al.* (2006) [17] and Fahim (1994) [18], but higher than the report of AICRP (P) of Assam (2015-16) and Hmar (1993) [19] in LWY. Higher ADG might be due to the fact that in T₁ higher testosterone level was observed which in turn affected the anabolic hormones to enhance growth (Mann and Lutwak-Mann, 1981) [20].

Table 1: Performance of pigs under different method of castration

Fortnight	Treatment group			f Value	p Value
	C	T1	T2		
Fortnightly Body Weight (kg)					
0 th	13.58 \pm 1.94	13.57 \pm 0.70	13.40 \pm 0.76	0.01 ^{NS}	1.00
1 st	18.75 \pm 2.26	24.79 \pm 0.80	18.80 \pm 0.77	1.52 ^{NS}	0.25
2 nd	25.25 \pm 2.31 ^b	30.07 \pm 0.81 ^a	24.80 \pm 0.85 ^{ab}	4.04 ^{**}	0.04
3 rd	33.25 \pm 2.19 ^b	39.21 \pm 0.71 ^a	32.80 \pm 0.82 ^b	6.86 ^{**}	0.01
4 th	41.50 \pm 1.74 ^b	48.14 \pm 0.70 ^a	40.60 \pm 0.83 ^b	12.89 ^{**}	0.001
5 th	49.42 \pm 1.86 ^b	56.71 \pm 0.66 ^a	48.20 \pm 1.07 ^b	13.80 ^{**}	0.001
6 th	57.25 \pm 1.35 ^b	64.36 \pm 0.69 ^a	55.60 \pm 0.81 ^b	23.16 ^{**}	0.001
7 th	64.92 \pm 1.33 ^b	71.64 \pm 0.63 ^a	62.30 \pm 2.10 ^b	13.62 ^{**}	0.001
8 th	72.80 \pm 1.44 ^b	78.86 \pm 0.64 ^a	68.80 \pm 2.20 ^b	15.73 ^{**}	0.001
9 th	78.00 \pm 1.24 ^b	84.71 \pm 0.71 ^a	74.90 \pm 2.57 ^b	11.59 ^{**}	0.001
10 th	83.67 \pm 1.26 ^b	90.29 \pm 0.83 ^a	80.90 \pm 2.49 ^b	10.68 ^{**}	0.001
11 th	89.68 \pm 1.45 ^b	95.57 \pm 0.87 ^a	86.60 \pm 2.71 ^b	8.23 ^{**}	0.004
12 th	94.00 \pm 2.01 ^b	100.64 \pm 0.83 ^a	91.86 \pm 3.52 ^b	4.96 ^{**}	0.02
Average ADG (g/day)	446.76 \pm 5.24 ^b	483.73 \pm 4.79 ^a	435.56 \pm 17.95 ^b	7.21 ^{**}	0.002
Average ADFI (g)	1889.40 \pm 30.97 ^{ab}	1931.00 \pm 12.50 ^a	1821.40 \pm 26.36 ^b	3.97 [*]	0.04
Average FCE	4.23 \pm 0.06 ^b	3.99 \pm 0.04 ^a	4.20 \pm 0.13 ^b	3.97 [*]	0.04

(**) Significant (P <0.01), (*) Significant (P <0.05) and ^{NS} Non-significant

Note: Means bearing at least one common superscript in each row do not differ significantly.

The overall ADFI (g) and FCE in the present study during experimental periods were 1889.40 \pm 30.97g and 4.23 \pm 0.06; 1931.00 \pm 12.50g and 3.99 \pm 0.04; and 1836.40 \pm 26.36g and 4.24 \pm 0.13 respectively in C, T₁ and T₂. Statistical analysis showed a significant (P <0.05) difference among the treatment groups in ADFI and better FCE in T₁ group. The poor FCE in surgically castrated pigs might be due to more energy requirements to produce a unit of body weight, so, when the fats gradually deposited in surgically castrated castrate pigs it required more energy, which led to more feed intake. (Balaji *et al.*, 2006) [17].

Conclusion

From the present study it was observed that pig castrated with Silver Nitrate was found to have best performance in terms of body weight, ADG and FCE. Therefore, from the present research work it may be concluded that chemical castration can be used as an alternate method of castration to surgical castration in reducing the boar taint. But, further research may be carried out on chemical castration for longer rearing period to ascertain the present finding.

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