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Entrepreneurship potential of pork production under intensive system of management

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Abstract

A study was conducted on profitable rearing of Large White Yorkshire breed of pigs for the purpose of meat, in Puducherry, a union territory in Southern India with predominately hot and humid climate. A total of four pigs were reared for a period of 90 days in the *pig sty unit* of the Livestock Farm Complex, Rajiv Gandhi Institute of Veterinary Education and Research, (RIVER) Puducherry. During the study period, the average body weight gain was 40 kg. The live weights of the four pigs were (i) 50.4 kg (ii) 53 kg (iii) 44 kg (iv) 55 kg. The cumulative feed conversion ratio recorded was 3.165. An average dressing percentage of 71.44% was obtained from the slaughter of the pigs. The data obtained in the current study may be useful as reference values for the scientific pork production as potential entrepreneurship opportunity, as this is the first study of its kind in Large White Yorkshire pig.

1. Introduction

India is one of the fastest growing countries in livestock sector. It needs an integrated approach in livestock farming to secure food for the fast-growing population. Piggery has superior potential to provide a faster economic return for the farmer than any other domesticated species because it requires low upkeep and least amount of input and investment. Pigs are the most fertile animals with high fecundity and short generation time. A sow can be bred as early as 8-9 months of age and can farrow twice in a year with a litter size of 6-12 piglets/ farrowing (Huynh et al. 2006). Pig farming is becoming increasingly popular among other domesticated species in socioeconomically disadvantaged areas, especially in the north-eastern states, because it has a higher potential to result in a faster economic return for the farmer (Bonneau et al. 2011). Among the various livestock species, pigs are one of the most potential sources of meat and are the most efficient feed converters (1:3) after broiler chicken. They can utilise wide variety of feed like grains, forages, swill, and convert them to valuable nutritious meat. They are renowned for their meat yield and have a dressing percentage that ranges from 65 to 80% as opposed to other livestock whose dressing percentage does not exceed 60%. Pork is highly nutritious with high fat and lower water content and has got better energy value than that of other meats. Apart from meat, their hair is used as bristles in the brush industry and other by products as manure. Pig farming also provides employment opportunities to seasonally unemployed rural farmers. They are reared in total confinement in the intensive system which is common in cities. Socioeconomic issues, such as worries about animal health, may alter and have a significant impact on the market for pork products in the future, as well as changing socio-cultural values (Thornton 2010). Growing population drives the demand for pork (and other meats). Furthermore, as developing countries' populations become more prosperous, they consume more meat (McGlone 2013). Based on these facts, present trial was undertaken to study the growth performance of pigs in intensive system of management and the production of pork from the same to prove the potential of pork production as

entrepreneurship opportunity.

2. Materials and methods

2.1 Study area

This study was conducted over a period of four months between March and June 2022 at the Livestock Farm Complex, Rajiv Gandhi Institute of Veterinary Education and Research (RIVER) and the Department of Livestock Products Technology, RIVER, Puducherry, India. Puducherry district is located between 11° 46' and 12° 13' North and 79° 36' and 79° 53' East, and has a population of 9,46,600 people spread across an area of 293 sq. kms. Puducherry experiences mostly hot and humid climate which ranges from 26º C to 38º C with relative humidity ranging from 70-80%.

2.2 Experimental animals

Four clinically healthy large white Yorkshire piglets of age two and a half months were selected and purchased for INR 3,500 per piglet for the present study and maintained at the RIVER Livestock Farm Complex under intensive system in the pig sty with an average body weight of about 8 kg.

2.3 Daily Routine activities

Cleaning of the sty involved cleaning of the water trough and manger. Feeding of pigs was done with concentrates (Krishna nutrition company) and swill feeding in the evening that included kitchen waste and food left overs which was hygienically segregated in steel bins and transported to the pig sty. The concentrates were purchased at INR 1840 per 50 kg bags and the swill was procured free of charge. A total of INR 11,560 was spent on the procurement of feed which mounts to INR 2,890 being spent on feed per pig.

2.4 Managemental practices

Summer management was carried out through the use of water showers promoting wallowing. Vital parameters were checked once a week to determine the health of the animal. Deworming was done with Albendazole @ 7.5 mg/kg body weight. All the pigs were vaccinated with Foot and Mouth Disease (FMD) vaccine- Raksha by Indian Immunologicals Ltd.

2.5 Pre-requisites for slaughter

Pigs were starved overnight before slaughter, with feed being withdrawn 12 hours prior to slaughter. They were secured tightly with strong ropes, with forelimbs and hind limbs tied together and rope tying the snout. Stress was minimised as much as possible as it may affect meat quality. The pigs were transported with the above-mentioned restraining technique by choosing a convenient mode of transportation. All the equipment was sterilised and kept ready prior to the arrival of the pigs. Water was heated to 64 ^{0}C prior to slaughter for scalding.

2.6 Slaughtering procedure

Before slaughter, pigs were well rested and externally cleaned of any dirt and debris. The slaughter procedure includes several steps, such as holding, ante-mortem inspection, external washing, stunning, bleeding, scalding, scraping, singeing, shaving, washing, decapitation, evisceration, post-mortem inspection, halving, final washing, and chilling (Fig. 1).

Fig.1 *Flowchart for slaughter and dressing of pigs*

2.7 Parameters investigated

a. Body weight: Individual body weights were measured at weekly intervals beginning from week 1 to week 6.

b. Body weight gain: Body weight gain was measured as the difference between each weighing period's final and starting weight.

c. Feed conversion ratio (FCR): FCR is the relation between an animal's feed intake and weight gain as a result of that intake. The FCR is a metric used to assess an animal's productivity and efficiency. The ratio between feed consumption and body weight gain was used to calculate the FCR.

d. Live weight: The weight of an animal prior to slaughter and preparation as a carcass.

e. Carcass weight: The carcass weight refers to an animal's weight after it has been slaughtered with all internal organs removed and in some cases the head and inedible or undesirable parts of the tail and legs are removed as well.

f. Offal weight: With the exception of skin, offals are all non-carcass parts of slaughtered animal. Following the slaughter procedure offals are collected and weighed in a clean and hygienic manner. It consists of the bones, cartilage, and other bodily parts that were still connected after the slaughtering.

g. Dressing percentage: It is determined by dividing an animal carcass weight with edible offals by its live weight and expressing the result as a percentage.

3. Results and discussion

The results of the current study are presented in Table 1, which includes the body weights of the respective pigs over a period of 6 weeks. Table 2 depicts the feed conversion ratio, live weight, and carcass weight of pigs. Table 3 depicts the average offal weights and percentages. Table 4 tabulates the dressing percentages of four pigs. The average weights of the pork wholesale cuts are represented in Fig. 2. Every week from the first to the sixth, the weight of each subject was recorded using a weighing scale. To estimate the growth of the pigs, they were measured for girth and length (from poll to the base of the tail).

3.1 Body weight gain

The average body weight gain during the research period was 40 kg. This is slightly less than the normal average pig's weight gain and this can be attributed to the weather conditions (Lopez-Verge et al. 2018). Table 1 depicts the body weight gain (kg) of four pigs over a 6-week period.

Table 1. Weekly body weight (kg) of pigs

Week	Pig 1	Pig 2	Pig 3	Pig 4	Average
1	13	11	11	13	12
2	24	22	18	23	21.8
3	32	31	25	27	28.8
4	36	37	33	43	37.3
5	45	48	42	52	46.8
6	54	56	44	54	52

3.2 Feed conversion ratio (FCR)

The FCR is one of the most important aspects of livestock management. It measures an animal's ability to convert feed mass to the desired output. Table 2 depicts the FCR of the four pigs. The average FCR of the pigs was 3.165 which was within the normal range of 3 to 3.2 in pigs. Factors influencing feed conversion ratio include animal genetics, farm animal age, feed quality, and farm management. The pig's efficiency at converting feed to weight decreases as it grows.

3.3 Live weight

The weight of an animal is taken before slaughter and prepared as a carcass. Utilising an image analysis system, the live weight of pigs can be calculated from their dimensions (Brandl and Jorgensen 1996). The live weights of the four pigs (kg) are depicted in Table 2. The factors that affect an animal's live weight include genetics, the effects of sex, birth weight, weaning age, parity of the dam, sorting by weight, split-suckling, health status, an efficient environment, and floor space.

3.4 Carcass weight

The pig carcass weights of four pigs are depicted in Table 2. The carcass weights of the pigs were within the normal range for pigs of this age group. For pigs, it is the weight of the cold, eviscerated body of the killed pig, either whole or cut in half along the midline, after the tongue, bristles, hooves, genitalia, flare fat, kidneys, and diaphragm have been removed (Cawthorn and Hoffman 2014).

Table 2. Feed conversion ratio, live weight (kg), and carcass weight (kg) of pigs

Parameter	Pig 1	Pig 2	Pig 3	Pig 4	Average
FCR	3.048	2.77	3.048	3.787	3.165
Live weight	50.4	53	44	55	50.6
Carcass weight	34.5	36.5	29.5	34.25	33.7

3.5 Offal weight

The majority of offals have the capacity to be used as human food, but this capacity can only be achieved if the offals are gathered hygienically, examined, and certified fit for human consumption before being cleaned and prepared properly (Hoffman and Cawthorn 2014). Inedible offal is either burned or buried, processed into tallow and beef meal, or, if appropriate, utilised as pet food (Spooncer 2003). The offals that were hygienically collected in the current study were the head, blood, tail, liver, lungs, intestine, spleen, kidney, heart, and hooves. Table 3 indicates the weights of the offals (kg) and percentage of each with respect to the total offal.

Table 3. Average weight of the offals (kg) and percentage each constitutes

Offal	Weight	Percentage
Head	4.06	40%
Blood	0.793	8%
Tail	0.095	1%
Liver	0.955	10%
Lungs	0.469	5%
Intestines	1.865	19%
Spleen	0.108	1%
Kidney	0.243	10%
Heart	0.342	2%
Hooves	1.243	12%

3.6 Dressing percentage

Dressing percentage, also known as carcass yield, is the ratio of dressed carcass weight to the weight of the live animal expressed in percentage. The average dressing percentage depends on a number of factors. Finishing diets high in fiber generally result in lower dressing percentage. The intestinal mass, transport distance, gut fill, and time spent in lairage all

have an impact on dressing percentage (Gentry et al. 2002). Depending on the anatomical removal site, the head can make up between 5 and 7 percent of the final live weight, while the front feet can make up about 1 percent. The heart (0.4%), liver (1.7%), and kidneys (0.5%) are other visceral organs that can affect dressing percentage and are regulated by a number of management techniques (Boler 2014). The average dressing percentage of pigs fall in the range of 65-80%. The carcass weights and dressing percentages are tabulated in Table 4.

Table 4. Carcass weight (kg) and dressing percentage of pigs

Pig	Carcass weight	Dressing %
1	34.50	71.40
2	36.50	71.67
3	29.50	70.42
4	34.25	72.30
Average	33.69	71.45

The pig carcass was sliced into large meat cuts called "wholesale cuts" to make it easier to handle and ship. They are made into wholesale cuts with knives, saws, and other mechanical tools. Jowl, loin, Boston butt, picnic shoulder, belly, and ham are among the wholesale cuts. The average weight of the whole sale cuts was as follows: Jowl = 0.745 kg, picnic shoulder = 5.615 kg, Boston butt = 5.015 kg, loin = 12.615 kg, belly = 8.11kg, and ham = 1.54 kg. In the current study, the jowl contributed 2%, the picnic shoulder 17%, the Boston butt 15%, the loin 37%, the belly 24%, and the ham 5%, as shown in Fig. 2. One of the most flavorful and cost-effective cuts is the shoulder (Moon et al 2003) which has the highest fat content. Tenderness, juiciness, and flavor are all attributes of more marbled pork cuts.

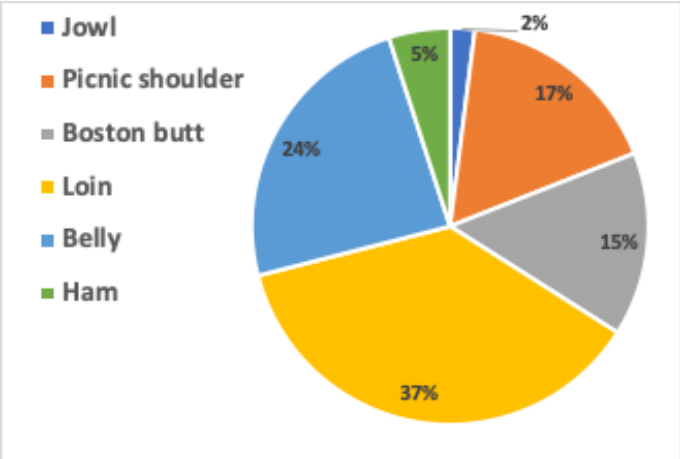

Fig.2 *Percentage pie chart of average weights of wholesale pork cuts*

3.7 Economics of Production

The total cost of production was INR 27,517. The average cost of production per pig amounts to INR 6,879.25. Pork was sold at the cost of INR 400 per kg. A total of INR 55,160 was obtained from the sale of pork and offals. Hence it can be concluded that a profit of INR 27,643 was made from the above-mentioned study.

The Benefit-Cost Ratio (BCR) was observed to be 2.0

5. Conclusions

Commercial pig farming for meat production in India is one of the best and most profitable business opportunities for the Indian people. Pigs are the fastest growing animals with a higher efficiency of feed conversion. Effective pig management entails getting the pig to its optimum weight as quickly as possible and with as few inputs as possible, while maximising the quality of the final product-pork. Pig slaughter is a common practice in intensive pig farming and is done in order to obtain pork. The carcass is divided into jowl, loin, Boston butt, picnic shoulder, belly, ham, and other minor cuts. According to the findings of this study, intensive pig rearing is more profitable.

Declarations

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Conflict of interest: The author declares no conflict of interest

Ethics approval: The study was reviewed and approved by Animal Ethics Committee of RIVER, Puducherry

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