

Characters of Henan Dairy Goat and its Development in Central China

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Abstract: The productive characteristics of Chinese Henan dairy goat and its development in central China are presented. Adult males being 82.86 cm and adult females 65.27 cm high at withers, weighing 69.9 and 39.96 kg, respectively. This breed has a high reproductive performance. Male and female kids reached puberty at a mean age of 120 and 150 days, respectively. The number of kids at one time varies from single to septuplet with the kidding rate is given as 2.02. Goat fed only on grass in first parity period, produced 619.19 kg milk in 305 days of lactation and 668.4 kg in second parity, 698.73 kg in third parity. The total solids, protein, ash content were rich in goat milk. On slaughter performance when kids are 10 months old, the live weight is 37.25 and 33.15 kg, carcass weight is 19.00 kg and 16.34, the slaughter rate are 54.09 and 53.00%, carcass dressing rate are 43.62 and 42.11%, respectively in male and female kids. The dairy goat's fate in Henan province will be great attention.

Key words: Henan dairy goat, production performance, goat milk, sheep, China

INTRODUCTION

China has a long history of goat farming and is also one of countries with a large amount of goat production. There are 34 indigenous goat breeds listed in the Domestic Animal Diversity Information System (DADIS) of Food and Agriculture Organization (FAO) and 20 breeds were described in detail in sheep and goat breeds in China (Tu *et al.*, 1989). It is well known that domesticated goats (*Capra hircus*) are generally referred to as poor-man's cow because of the significant role they play in the economic life of resource poor farmers in the traditional farming system. Apart from being a source of high quality meat, milk, fiber and skin, goats are also used as reserves for quick source of money in times of pressing need. The increasing interest in the consumption of goat milk in many regions where it is seen as a healthy substitute for cow's milk especially for ulcer and diabetes patients (Peacock, 2008). Henan is one of the pioneer provinces in China with about 19.97 million goats in 2009 which occupied 7.02% of the gross quantity of China; the goat flock is the fourth largest after the Inner Mongolia, Xinjiang and Shandong province. The Henan dairy goat is one of the local goat breed, the population was estimated at 0.6023 million heads, most of which are reared in low-input backyard of Zhen Zhou, Luoyang, Kaifeng and Nan Yang country of Henan province. The main regions of dairy goat existed which is located at

112°15'-114°30"E longitude and 34°20'-34°50"N latitude with an average annual temperature of 14-14.9°C, average rainfall of 600-700 mm, relative humidity 65-70% and 215-221 days frost-free period. The main crops are wheat, corn, cotton, potato, peanut seedling. Artificial pastures are alfalfa, Shamrock. Henan dairy goat is a prolific and major meat-milk producing animal and has better adaptability to extensive management in mountain areas and has better immunity against diseases, higher reproduction rate and better meat-milk quality which are natural gene reservoir and the good original material of crossbreed predominance and high yield. Due to the higher productive performance, rearing this goat breed already brought local farmers considerable economic benefits. Goats were kept in small herds and in combination with other breeds. The most of households were keeping 5-10 goats each and were taking their goats out for daytime grazing. Because of no scientific selecting system and cultivating were conducted in recent year, some dominant genes of recessive were not protected perfectly which restrict the development of this goat breeding. Studies on dairy goats have been negligible compared to meat goat in China. It was only in recent years some researches on Henan dairy goat were featured in the scientific literature (Wang *et al.*, 2009, 2010a; Feng *et al.*, 2009). New opportunities to practice innovative breeding technology for dairy goat production comes from the application of more recently developed knowledge on

production of dairy goat in China and on strategy of prevention. So, more and more further researches on this breed have being carried out in recent years. In this study, the productive characteristics and research status are reviewed.

GROWTH PERFORMANCE OF HENAN DAIRY GOAT

Henan dairy goats have straight to concave noses and carry their small ears horizontally. The common are white. Two does showed in Fig. 1 and 2. The dairy goats are medium to large sized animals, their height at the



Fig. 1: A doe with three kids



Fig. 2: Adult doe

Table 1: Average body weight of Henan dairy goat at early different ages

Days	Body weight (kg)		Months	Body weight (kg)	
	Male kids	Female kids		Male kids	Female kids
1	2.69±0.37	2.57±0.30	1	5.80±1.31	4.24±0.94
2	2.89±0.40	2.79±0.36	2	9.03±1.59	6.44±1.13
3	3.13±0.52	3.02±0.43	3	11.27±3.02	8.83±0.14
4	3.20±0.52	3.12±0.49	12	51.72	25.60
5	3.44±0.54	3.32±0.54	24	69.9	39.96
6	3.66±0.56	3.56±0.49	-	-	-
7	3.68±0.70	3.57±0.70	-	-	-

withers is 82.86 and 65.27 cm and adult male and female weigh 69.9 and 39.96 kg, respectively. Male and female kids reached puberty at a mean age of 120 and 150 days, respectively with an average body weight of 11.27 and 11.63 kg. Growth performance of kids of 3 months was calculated by Wang *et al.* (2010b) from birth to 7 days of age, the development of male and female kids is similar. After 7 days, male kids tend to develop faster than female lambs (Table 1).

REPRODUCTIVE PERFORMANCE OF HENAN DAIRY GOAT

The economic viability of livestock exploitation is closely related to animals attaining sexual maturity at a precocious age which means more offspring could be produced during an animal's life (Becker-Silva *et al.*, 2000). Henan dairy goat is highly fecund and kid twice a year or more commonly thrice in 2 years and the number of kids at one time varies from single to septuplet. Henan dairy goat starts estrus from august to the next years' February, the most in September. The kid reached puberty at 5-7 months, estrous cycle is 20.01 days, estrus duration periods is 28.34 h. The age of fist mating is from 8-10 months. The mean gestation length was 150.11 days. The average litter size of 2036 does raised under extensive conditions was 2.04; of these, 28.2% had one kid, 21.3% had two kids, 20.5% had three kids, 15.9% had four kids. Kids had a very high survival rate. Sexual maturity of Henan dairy goat is attained later than in other breeds. Guanzhong dairy goats attained puberty at 120-150 days, Laoshan dairy goats at 90-120 days. The average kidding rate of Henan dairy was >200% which was higher than the other prolific goat breeds. It is reported that that the early sexual maturity of animal was respectively related to the high concentrations of testosterone and 17 beta-estradiol in plasma in the earlier posmatal period. Because the high concentrations of testosterone and 17 beta-estradiol in plasma were related to the high level of synthesis and secretion of LH from the pituitary in high prolific animals (Wang *et al.*, 2010a, b). The mechanism of high fecundity of Henan dairy goat has been studying in the lab.

Observations suggest that the male kids reached puberty at 4-6 months however, male kids should not be used for breeding until the age of 10 months because of body development. Semen ejaculated by male kids at

Table 2: Quality of semen of Henan dairy goat at different ages (mean±SD)

Age (months)	N	Volume	Concentration (10 ⁸ mL ⁻¹)	Motility
6	136	0.54±0.14	19.24±5.47	0.70±0.12
10	136	1.07±0.35	24.26±0.78	0.85±0.26
24	136	1.24±0.31	27.38±0.53	0.90±0.23

different ages and by mature kids, collected in artificial vagina was microscopically examined. Some of the ammeters used to assess semen quality are given in Table 2. Ejaculates containing spermatozoa were collected from male kids at 6 months but the concentration and volume of spermatozoa per ejaculate were lower than in ejaculates from adult buck. Ejaculates of male kids also had a high incidence of dead and deformed spermatozoa. At 10 months, the motility of sperm from male kids was similar to that of adult kids. The other records of performance in Henan dairy goat have not been published.

MILK CHARACTERS

Milk nutrition: In many countries, goat milk is marketed as a health food with relative advantages over other types of milk from different animal species and is named cow of poor. It is known that goat milk is a valuable source of protein, fat, calcium, iron, phosphorus, magnesium and vitamins, particularly Vitamin A. Recent studies have shown that several of these minerals are more easily absorbed from goats' milk than cow's milk. The small fat globules of goats' milk also make it more easily digestible than cow's milk and therefore particularly suitable for children and the sick (Peacock, 2005). The quality of milk from Henan dairy goat was reported that are given in Table 3.

The contents of total solids, protein, fat, ash were decreased with the lactation days raised and the content of lactose was increased with the lactation days raised. The total solids, protein, fat, ash of the milk in the 1st day after giving birth were highest; the content of lactose in the first day after giving birth was minimum at $2.24 \pm 0.18\%$. Total solids, protein, ash content were higher than that in other goat milk (Chen *et al.*, 2008), the contents of fat, lactose, calcium and phosphorus were lower than that in other goat milk. It was concluded that Chemical composition of goat milk is influenced by a number of factors including breed, individual differences,

diet, season, stage of lactation and environment. It is believed that the contents of chemical composition in Henan dairy goat milk changed with the lactation days raised and was closely related to the present management and nutrition condition (Wang *et al.*, 2010a, b; Yuqin *et al.*, 2010). This is one explanation for the high survival rate and instability growth rate of kids after birth. Research on the composition of milk from 14 Henan dairy goat, averaging two kids each at 35 days of the second lactation indicated that the contents of fat (1.78%) and protein (3.41%) were lower than those reported for milk from Cheviot (6.66 and 4.67%), Dorset (6.73 and 5.04%), Finn (6.57 and 4.83%) and Romney ewes (6.64 and 5.06%) (Fraser *et al.*, 1987), Tan sheep (6.55 and 4.27%). In those years, research on protein of composition of goat milk using molecular methods were also documented (Wang *et al.*, 2011). Compared the composition of goat milk with sheep milk, there are some different, the mechanism is not know (Park *et al.*, 2007; Shu *et al.*, 2008; Feng *et al.*, 2009). The breed, grazing or housing and kinds of feeds are possibly contributed to this question.

Milk yield: The yield of milk is affected by many factors but the major are two: one is genetic; another is environment which is also named management. The genetic effecting on the yield of milk is account by 30~35% and the other of 65~70% is affected by management and environment. The milk yield of Henan dairy goat is high show in Table 4. Goat fed only on grass in one parity period, produced 619.19 kg milk in 305 days of lactation. And 668.4 kg for two parity, 698.73 kg for three parity and 656.40 kg for four parity. The highest individual is 1100 kg in 305days. Henan dairy goat milk yield at 3rd parity (kg day^{-1}) was 2.29 in total 305 days and higher than in Guang Zhong dairy goat with 2.45 kg day^{-1} in total 300 days and after Laoshan dairy goat with 2.56 kg day^{-1} in total 240 days. The differences among breeds are affected by breeding programme, management and genetic factors (Zhao, 2011).

Table 3: The content of goat milk

Days after	Contents of total solids (%)	Protein (%)	Fat (%)	Lactose (%)	Ash (%)	Calcium (%)	Phosphorus (%)
1	23.12 \pm 4.00	9.71 \pm 6.05	4.66 \pm 1.39	2.24 \pm 0.18	1.65 \pm 0.56	0.16 \pm 0.05	0.16 \pm 0.07
2	19.78 \pm 5.72	8.04 \pm 5.12	4.42 \pm 1.99	2.46 \pm 0.48	1.26 \pm 0.17	0.19 \pm 0.02	0.20 \pm 0.06
3	18.47 \pm 3.71	6.65 \pm 1.40	3.81 \pm 1.30	2.68 \pm 0.46	1.11 \pm 0.20	0.21 \pm 0.04	0.15 \pm 0.02
4	18.21 \pm 2.60	7.24 \pm 0.97	3.70 \pm 1.00	2.88 \pm 0.32	1.32 \pm 0.04	0.20 \pm 0.04	0.19 \pm 0.05
5	17.51 \pm 3.52	6.01 \pm 1.33	3.44 \pm 2.55	3.17 \pm 0.45	0.98 \pm 0.26	0.19 \pm 0.04	0.18 \pm 0.01
6	15.24 \pm 1.34	4.55 \pm 0.81	3.21 \pm 0.85	3.22 \pm 0.29	1.05 \pm 0.18	0.15 \pm 0.02	0.14 \pm 0.08
7	14.26 \pm 0.37	4.79 \pm 0.31	2.91 \pm 0.31	3.17 \pm 0.23	1.04 \pm 0.17	0.17 \pm 0.01	0.17 \pm 0.03
15	11.44 \pm 1.32	3.53 \pm 0.56	2.65 \pm 1.05	3.43 \pm 0.27	0.93 \pm 0.07	0.19 \pm 0.01	0.12 \pm 0.01
25	14.32 \pm 1.21	3.53 \pm 0.62	2.22 \pm 0.87	3.43 \pm 0.23	0.88 \pm 0.06	0.15 \pm 0.02	0.22 \pm 0.02
35	10.99 \pm 2.80	3.41 \pm 0.81	1.78 \pm 0.56	3.44 \pm 0.14	0.79 \pm 0.12	0.20 \pm 0.01	0.16 \pm 0.03

Table 4: An average milk yield of different parities in Henan dairy goat

Items	Parity			
	One	Two	Three	Four
No	156.00	156.00	156.00	156.00
Milk yield (kg)	619.19	668.48	698.73	656.40
Percent of the peak yield (%)	92.63	95.67	100.00	93.94

MILK OR MEAT USE

In recent years, at home and abroad there have been some changes in the meat sheep and goat market which provides the huge developmental space for sheep and goat industry and makes mutton production truly become a golden industry. Compare with the swine and poultry farming industry, sheep and goat has the low rate of reproduction, more limiting factors and slow growth rate. As mutton consumption increases, the trend of demand exceed supply appears. In China for the low cost of production, sheep and goat farming has a higher efficiency. From the nearly 10 years of breeding market analysis, pig and chicken in the market has not been on a steady and prices often fluctuate wildly but the mutton has sold well. Because breeding of meat sheep and goat is relatively slow, the increase of the quantity and market demand increase is in the dynamic equilibrium state make it become a less investment, steadier benefit cultivation item. Although, Henan is the fourth largest goat flock, the extensive traditional systems are predominantly practiced in Henan province for goat husbandry, this management system has resulted in low productivity due to constant exposure to low levels of nutrition and disease. There is more need for improvement of meat yielding capacity of crossbred and less need for improvement of milk yielding capacity of dairy goats breed for purpose of preservation currently in Henan province. This is likely to enhance the attainment of self-sufficiency in meat and dairy production in the areas where the people reared dairy goat. They can make production plan to meet the changing demands of market (Wang, 2011). Another important reason is that in Henan province, there are no milk processing industry only used for dairy goat milk, farmer' milk is sold to faraway where goat milk proceeds, like Shanxi province but it is inconveniency and cost is too high. Some goat milk is reared to use feed sheep lambs whose mother have two or more lambs. So, the number of dairy goat is decrease, in some areas, meat production are their ultimate uses because the meat of dairy goat is also good. It is reported that on the slaughter performance when kids are 10 months ages, the live eight is 37.25 and 33.15 kg, carcass weight is 19.00 and 16.34, the slaughter rate are 54.09 and 53.00%, carcass dressing rate are 43.62 and 42.11%, respectively in male and female kids (He *et al.*, 2007).

THE DAIRY GOAT'S FATE IN HENAN PROVINCE

There is currently widespread interest among farmers in East Africa in adopting a more intensive dairy goat system based on crossbreeding local goats with European dairy breeds. Generally governments have made patchy and ineffectual attempts at developing this new sector (Peacock, 2008). While in China, the current trends confronting dairy goat farmers there is a rapidly growing interest in switching to meat goat farming systems because there is an insatiable demand for meat goat breeds. Efforts have been made to improve meat and milk yield capacity of local breeds of goats in Henan provinces. Greater attempts have also been made by upgrading the dairy goat breeds by crossbreeding with faster growing Boer goat breed and high yield milking Saanen dairy goat breeds. But Henan dairy goat is not systematically used for crossbreeding in Henan province that unlike Shanxi province where there are large scales dairy goat populations and well foundation for milk production, processing, selling and researching.

CONCLUSION

Thereby dairy goat is as substitutes of meat goat in market from last decade years. One hand, there is an urgent need for a significant scaling-up of current meat goat development activities to meet this rising demand, on the other hand, there is also an urgent call for government and some departments to take measures to protect the species resources, Henan dairy goat, otherwise they will become extinct.

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