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Non- genetic factors affecting annual wool yield in German Angora rabbits

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Abstract

Wool yield data on first and second annual wool clips and cumulative yield over first two years on 588 German Angora rabbits of either sex, maintained at Angora Rabbit Breeding Farm, Kandwari, Palampur (HP) in sub-temperate, mid-hill region of Himachal Pradesh at altitude of 1300 mts above MSL over a period of 8 years (2000 to 2007) were analysed to study the effect of year and season of kindling and sex of the animal on performance for these wool yield traits. All rabbits were farm bred progeny obtained during subsequent generation mating of a foundation stock (8 bucks and 32 does) of an improved imported strain of German Angora breed. The overall least squares means estimated were 594.22 ± 67.13 g, 591.82 ± 193.67 g and 1185.96 ± 202.96 g for first annual, second annual and cumulative wool yields respectively. The year of kindling effect was observed significant (P<0.01) on all wool production traits under study while seasonal influence was significant (P<0.05) for first annual wool clip only. The sex differences were observed statistically non-significant. From the results, it can be concluded that among different non-genetic factors, the period of kindling is the single largest effect influencing performance of German Angora rabbits for annual and cumulative wool production traits.

Key words: Annual wool yields, German angora rabbits, Non- genetic factors.

Introduction

Angora fibre or Angora wool reputed for its softness, fluffiness and silky texture refers to the "down coat" produced by Angora rabbits and is suitable for manufacture of quality woollen garments like shawls, stole, mufflers, caps and woollen undergarments either alone or in blends with other wools. Owing to its high importance for woollen textile industry, the Angora rabbit production is being promoted in temperate and sub-temperate regions of the country. The German Angora is the largest and most improved stock among the present varieties of Angora rabbits reputed for its large body size, high prolificacy and higher annual wool yield ranging from 700-1200 gm/ animal. Wool production is the single most important economic trait in Angora rabbits and appears to be affected by a number of genetic and non-genetic factors (Thebault *et al.*, 1992; Allain *et al.*, 1999; Katoch *et al.*, 1999; Sood *et al.*, 2007). The present study was, therefore carried on to study the influence of certain non-genetic variables on annual wool production performance of German Angora rabbits maintained under sub-temperate Indian conditions.

Materials and Methods

Annual and cumulative wool production records of first two years on 588 German Angora rabbits of either sex maintained at Govt. Angora Rabbit Breeding Farm, Kandwari, Palampur, Himachal Pradesh over a period of 8 years (2000 to 2007) were utilised in the present study. The data pertained to the subsequent generation progeny obtained from breeding of a foundation stock of 8 bucks and 32 does of an improved strain of German angora rabbits imported from Germany in 1994 for replacing the existing stock of German Angora rabbits maintained at this farm. The farm is located in the sub-temperate, mid-hill region of Himachal Pradesh at altitude of 1300 mts above MSL and at 32°62'N latitude and 76°32'E longitudes. The mean maximum and minimum temperature recorded was 28.4°C and 7.2°C with % RH of 50 to 70%. All animals were maintained under uniform housing, feeding and management conditions during entire period. The does were housed in individual flat- deck standard- sized wire mesh cages fitted with top entry and feeding and watering fixtures in the front. Apart from feeding of seasonal green forages and water *ad libitum*, the adult animals (> 6 months) were offered pelleted concentrate feed having 18-20 % of crude protein @ 175 g / day and each lactating doe was fed @ 275g/ doe /day. The shearing was manually done four times in a year at 90 days interval with first shearing at the age of 3

months. The annual wool production was calculated by adding the yield obtained at all the clips in a year and the cumulative wool yield was the sum total of the wool obtained over two years. The entire data was classified in 8 years of kindling with each year further subdivided in to 4 seasons viz. Winter (Nov.-Feb.), Spring (March-April), Summer (May-August) and Autumn (September-October) depending upon local agro- meteorological conditions and two (male and female) sexes. The analysis of data was done by Least squares method of fitting constants (Harvey, 1990) with significant sub-class differences tested by modified Duncan's Multiple Range Test (Kramer, 1957).

Results and Discussion

Means and variability: The overall least squares means estimated for first annual wool yield, second annual wool yield and cumulative wool yield were 594.22 ± 67.13 g, 591.82 ± 193.67 g and 1185.96 ± 202.96 g, respectively with corresponding coefficient of variation of 10.12 %, 29.34% and 15.74 % in the present study (Table 1). The estimates obtained in the present study were in close agreement with the findings of Sambher (1992) and Katoch *et al.* (1999) for the same traits but lower than the estimate of 775.75 ± 20.45 g reported by Singh *et al.* (2006) for annual wool production in German Angora rabbits. The estimates were however, higher than reported by Singh (1987) and Sood *et al.* (2007) in German Angora rabbits from the data of another farm in the state.

Effect of year of kindling: The analysis of variance revealed significant effect of year of kindling (P <0.01) on first annual wool yield, second annual wool yield and cumulative wool yield with an inconsistent

Table 1. Least squares means ± SE for annual wool yields in German Angora rabbits

Effect	No. of observations	1st year wool yield (g)	2nd year wool yield (g)	Cumulative wool yield (g)
Overall Mean (μ)	588	594.22 ± 67.13	591.82 ± 193.67	1185.96 ± 202.96
Year of Kindling		**	**	**
2000	118	616.68 ± 5.97^{bc}	515.67 ±17.25^{a}	1132.50 ± 18.61^{b}
2001	106	602.42 ± 6.40^{b}	585.83 ±18.49^{b}	1188.40 ± 19.94^{c}
2002	53	635.62 ± 8.48^{c}	514.55 ±24.49^{a}	1149.02 ± 26.42^{bc}
2003	33	630.97 ± 11.02^{c}	602.50 ±31.83^{b}	1233.42 ± 34.33^{cd}
2004	65	566.15 ± 7.84^{a}	642.86 ±2266^{b}	1209.13 ± 24.45^{c}
2005	21	571.39 ± 13.37^{a}	566.04 ±38.61^{ab}	1137.56 ± 41.65^{bc}
2006	86	563.78 ± 7.38^{a}	735.39 ±21.31^{c}	1299.25 ± 22.99^{d}
2007	105	547.01 ± 6.68^{a}	506.59 ±19.29^{a}	1053.75 ± 20.82^{a}
Season of Kindling		*	NS	NS
Winter	250	611.92 ± 7.92^{b}	544.87 ±22.89	1156.65 24.69
Spring	106	560.76 ± 9.16^{a}	571.98 ±26.47	1132.78 28.56
Summer	172	580.76 ± 8.43^{a}	599.31 ±24.36	1179.55 26.28
Autumn	60	585.96 ± 11.00^{ab}	481.30 ±31.78	1067.57 34.28
Sex of the animal		NS	NS	NS
Male	338	578.50 ± 7.67	569.00 ± 22.15	1147.41 ± 23.89
Female	250	591.10 ± 7.97	529.73 ± 23.02	1120.87 ± 24.83

** Significant (p<0.01); * Significant (p<0.05); NS: Non-significant

trend in wool production over the years attributable largely to variations in management practices over the years. These results were similar to the findings of Thebault *et al.* (1992), Sambher (1992) and Sood *et al.* (2007) in German Angora rabbits. However, Singh (1987) also observed non-significant effect of year of kindling on annual wool yields in Russian, British and crossbred Angora rabbits.

Effect of season of kindling: Among season of kindling, the means wool yields ranged between 560.76± 9.16 g (spring born) to 611.92 ±7.92 g (winter born) for the first annual wool clip, between 481.30 ± 31.78 g (autumn born) to 599.31 ± 24.36 g (summer born) for the second annual wool clip and 1067.57 ± 34.28g (autumn born) to 1179.55±26.28 g (summer born) but the seasonal differences were statistically significant only for first annual wool clip ($P<0.05$). Similar were the findings of Sambher *et al.* (1999) for these traits, but are contrary to the highly significant seasonal variations reported by Thebault *et al.* (1992), Gupta *et al.* (1995) and Sood *et al.* (2007).

Effect of sex: The sex of the animal did not affect any of the annual or cumulative wool production traits considered in the study and the wool production were similar in the individuals of either sex contrary to the reported findings of Magofke *et al.* (1985) and Sood *et al.* (2007) who reported significantly higher wool yield in female animals than in the males. However, similar non-significant differences among the sexes have also been reported in several earlier studies (Gupta *et al.*, 1995; Bhasin *et al.*, 1998; Sambher *et al.*, 1999) in German angora rabbits under sub-temperate climatic conditions.

From the results, it can be concluded that among different non-genetic effects influencing the performance of German Angora rabbits for annual and cumulative wool production traits, the period of kindling is the single largest effect.

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