Situation Analysis for the Performance Recording of Australian Meat Goats

M. Aldridge[1], D. Brown[2], T. Hooke[3], W.S. Pitchford[1]
[1] School of Animal and Veterinary Sciences, University of Adelaide, Roseworthy, [2] Animal Genetics and Breeding Unit, University of New England, Armidale, [3] Meat and Livestock Australia Ltd., University of New England, Armidale

ABSTRACT: The data entered into KIDPLAN, the national goat performance recording program in Australia was summarised. The summary includes the number of active breeding animals added since the development of the program, the number of records recorded per trait in 2013 with the average phenotype and variance and, the average EBV and accuracy for various traits since the programs' development. The number of active animals added to the program each year has increased from 299 up to 1526 at the peak and is currently at 1075 animals per year. The most common recorded traits are those for growth followed by carcase traits. Reproductive traits and parasite resistance traits are not commonly recorded by the majority of members despite having economic value. There has been genetic improvement for the growth and carcase traits over the past five years but there has not been any significant progress for reproductive and parasite traits.
Keywords: meat goat; genetics; KIDPLAN

Introduction

The Australian goat meat industry could benefit greatly from genetic improvement. The goat meat industry is limited in the genetic improvement it can currently make, due to the structure and history of the industry. The majority of production is achieved by rangeland producers harvesting from the feral population so there is a greater emphases on management practices than genetics (Shrestha and Fahmy (2005)). The second group of producers are mostly small herds of less than 100 does of various breeds, they do not actively make genetic selection and goat production is rarely the main enterprise of the business. These producers are more interested in conformation traits than improving production performance using estimated breeding values (EBVs). The producers that remain are seedstock and production orientated breeders of Boer goats. To improve the national genetic merit of the goat industry it is the small number of seedstock breeders that need to be targeted to distribute the superior genetics to the small producers and feral harvesters. Some but not many of these breeders are registered users of the national performance recording program, KIDPLAN.

The first major step to improve the genetics of meat goats in Australia was the acquisition of Boer genetics in the 1980's (Blackburn (2003); Norton (2004)). It wasn't until the mid-1990's that the breed was released from quarantine and to which all Boer lines in Australia descends from. The release of the Boer goats coincided with the introduction of KIDPLAN in 1997 (Ball et al. (2001); Norton (2004)). KIDPLAN is a national recording scheme that uses best linear unbiased prediction to calculate estimated breeding values for the use of producers. The use of KIDPLAN has varied over the years with fluctuations in the number of members and the number of animals recorded. There are two national breeder groups in Australia; The Boer Goat Breeders Association of Australia Ltd and Boer Goat Australia, there are also several smaller breeder groups in each state (BCS Agribusiness (2012)). None of the groups actively encouraging the use of KIDPLAN but some are more interested in performance recording than others. This was one of the driving forces for the establishment of Boer Goat Australia which aimed for greater recording of performance traits (BCS Agribusiness (2012)).

The recording in KIDPLAN is based on the national performance recording system in the sheep industry which uses LAMBPLAN. Pedigree information is submitted with the following traits; live weight (WT), eye muscle depth (EMD), C-Site fat depth (CF), scrotal circumference (SC), number of lambs "kids" born (NLB), number of lambs "kids" weaned (NLW) and faecal egg counts (FEC) (Meat and Livestock Australia Limited (2004)). Each trait can be recorded for each age group including; birth (B), weaning (W), post-weaning (P), hogget (H), yearling (Y) and adult (A). Data for each trait and age group can be entered and accessed online and used for genetic selection (Meat and Livestock Australia Limited (2004); Olivier et al. (2005)).

Meat and Livestock Australia published a report for the research, development and extension strategy of goats in 2012 (Meat and Livestock Australia Limited (2012)). One of the key recommendations was for the improvement of the genetic resource. Producer's comments suggest that breeding programs should aim to improve growth rate, carcase composition, fertility and worm resistance. The lack breeders using KIDPLAN could be improved if they were made more aware of the fact that the system can be used in such breeding programs.

The aim of this paper was to determine the current trends in performance recording and genetic improvement of the key traits. This will also help to identify opportunities for further improvement of the Australian meat goat industry.

Materials and Methods

Data. The data entered into the KIDPLAN database by registered users was summarised. The summary of data can be divided into three parts; the first is the number of active breeding animals added to the database each year since the establishment of KIDPLAN, the second is the 2013 entries for the number of records on each trait with the mean and variance of each and the third is the genetic trend for the following traits BWT, WWT, PWT, YWT, PCF, YCF, PEMD, YEMD, NLB, NLW. The genetic trend averages animals by the year of birth, it includes the number of animals recorded for that trait, average EBV and the average accuracy.

Results and Discussion

Change in the number of active breeding animals added. The number of active animals added to the KIDPLAN database gradually increased from its development in 1990 which began with 299 animals to 1997 with 1423 animals added (Figure 1). The number of animals added decreased to 579 in 1999 and there was little movement over the next decade. There are a few possible reasons for the lack of additional animals; Australia's largest drought in recent history, the lack of support from breed societies, producers may have expected stronger early gains and decided to opt-out and return to traditional selection on conformation, and a number of producers left the industry (BCS Agribusiness (2012)). Since 2007 the number of animals being added to the KIDPLAN database has again been increasing, this could be due to the increase in publicity and adoption by the more serious seedstock breeders. In the past two years the number of animals added has slightly decreased. This corresponds to a drive by the breed societies to educate and encourage users to remove animals that are no longer actively breeding or are not going to be used in breeding programs to be removed (BCS Agribusiness (2012)).

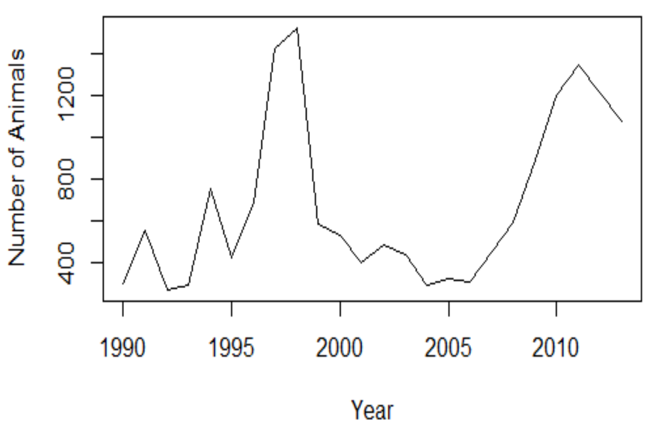

Figure 1: The number of active breeding animals added to the national performance recording program since the development stage to the present

Number of records per trait. The most common recorded traits submitted in KIDPLAN are those for weight and carcase composition, reproduction and then parasite resistance. A summary of the traits are summarised in Table 1 with the number of records submitted, the mean phenotype and the raw variance. Birth weight is the most commonly recorded trait with a total of 9631 records in 2013, the likely reason is it's the earliest trait recorded and so the first trait to be selected for, it is also relatively easy to record. By the time adult weight is recorded, there are fewer potential breeding animals remaining (221 animals) and producers are content with recording yearling weight (4046 animals). The reason for fewer producers recording C-site fat depth and eye muscle depth is because they need to be recorded by a qualified professional scanner which is an extra cost to the producer (Ball et al. (2001)). Few producers are submitting data for faecal egg counts which could be due to a cost limitation, lack of education, reliance on chemicals or a lack of importance placed on the issue. The variance for each trait is similar to those published by Ball et al. (2001) which suggests that genetic improvement can be made nationally.

Table 1: The total number of records, mean and raw variance entered for various growth, carcase, reprodctive and parasite resistance traits in 2013

Trait	n	Mean	Variance
BWT	9631	3.5	0.4
PWT	8614	31	24
YWT	4046	45	25
AWT	221	65	44
PCF	2371	1.8	0.2
PEMD	2333	19.1	18.2
NLB	1804	1.6	0.9
NLW	1804	1.1	0.8
PSC	125	23.5	11.4
PFEC	103	103	11.3

Genetic trend of traits. The overall improvement or decline in the national genetic merit can be observed by the changes in the average EBVs recorded by KIDPLAN (Table 2). A broader view of genetic change can be observed by grouping the traits into categories for growth, carcase and reproduction. There has been improvement in all three of these categories with the majority of genetic improvement in the growth traits followed by carcase and then the reproductive traits, analysis on parasite resistance has not been completed.

There is a slight trend for birth weight EBVs to be increasing, this is not a major concern as kidding difficulties are not commonly due to birth size (Greyling (2000)). There is a clear trend for increasing yearling weight which suggests active selection by breeders and likely a result of breeding programs for higher growth rates and yields (Ball et al. (2001)). The EBV for scrotal circumference has had no significant change, likely due to the low level of record-

Table 2: Average estimated breeding values for BWT, YWT, PWT, PEMD, PCF and NLB for the past five years. The regression coefficient, standard error of the slope and test of significance were calculated using the past 24 years of data

Year	BWT	YWT	PEMD	PCF	NLB
2009	0.04	0.64	0.06	-0.01	-0.05
2010	0.06	0.00	-0.06	0.00	-0.07
2011	0.01	0.72	0.07	0.01	-0.01
2012	0.04	0.87	0.04	0.00	-0.04
2013	0.04	1.37	0.14	0.01	-0.01
Regression coefficient	0.004	0.03	0.001	-0.001	-0.002
SE Slope	0.001	0.01	0.002	0.001	0.006
P-value	<0.001	0.01	0.667	0.746	0.001

ing for the trait. Eye muscle depth has had some improvement; however it has not been a significant change. The lack of improvement could be due to the cost of recording, so only the few producers that do record the trait on all animals in their herd are making genetic improvement. EMD also has a large amount of variance which would also account for some of the noticed improvement (Ball et al. (2001)). There has been a small movement in the average EBV for number of lambs born in the past five years. The trend is for fewer kids which is likely due to some producers wanting to decrease the risk of kidding difficulties which is a common problem for large litter sizes or they are correlated to other traits (Greyling (2000)). The slow rate of change is mostly due to a low phenotypic variance and a low accuracy for the EBV's.

Conclusion

Since KIDPLAN was introduced in 1997 there has been varying degrees of adoption by breeders. In the past 5 years the number of active breeding goats being added to the database is comparative to the peak when it was first released to the public. It should be the goal of Meat and Livestock Australia Ltd with the help of the breed societies to encourage this growth. Growth and carcase traits are commonly recorded but there should be more of an effort made to record reproductive and parasite resistance traits. There has also been an improvement recently for the average EBVs, in line with the goals suggested by producers and Meat and Livestock Australia Ltd. Reproductive and parasite resistance traits could benefit greatly from further research and education amongst breeders to encourage inclusion in breeding programs, which would improve accuracies and therefore genetic merit.

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