

# Genetic improvement of Australian meat goats

By

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# Declaration

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Michael Aldridge

Date: 10/02/2018

# Dedication

For my loving grandmother

**Rita Threlfall**

who always believed in me.

# Abstract

The Australian meat goat industry is rapidly changing. This change is predominantly due to the value of goat meat increasing and production moving from rangeland harvesting to fenced commercial systems. The aim of the project was to determine how goat meat production can be increased through genetic improvement. A meta-analysis and sensitivity analysis in the literature review identified selection for kid survival could increase lean meat production by 12.3 kg per genetic standard deviation and became the main trait of interest for the project.

The national performance recording scheme (KIDPLAN) is a database that was made available by Sheep Genetics. This producer recorded data contained pedigree and phenotypic information on 19,711 Boer goats. The KIDPLAN system provides estimated breeding values for Australian goat breeders and is the best opportunity for genetic improvement of meat goats.

A new kid survival trait was created from the birth and rearing type information. The mean kid survival rate was 0.72, with a phenotypic variance of 0.14 and a heritability of 0.09. As the kid survival trait showed variation and was heritable, bivariate analyses with the growth and carcass traits was done to determine its suitability to be included in a selection index. Birth type had a significant effect on kid survival. Kid survival was positively genetically correlated or not different to zero with all of the production traits. The survival trait was separated into three traits based on birth type for singles, twins and multiples. A multivariate analysis showed they were different traits with genetic

correlations of between 0.46 and 0.72. More work and accurate data is needed for them to be included in an index as separate traits and so kid survival should currently be treated as a single trait with birth type fitted as a fixed effect.

The current KIDPLAN index is based on modified sheep parameter estimates and economic values. Surveys were conducted nationally and were used to calculate economic values for the goat production traits. The results from the parameter estimates and surveys showed that goat genetic parameters are different to sheep and the current index is not representative of the industry. Three breeding objectives were created and simulated with six different recording practices. The key finding and recommendation for industry was to adopt a new index based on goat parameter estimates and economic values, also to include reproductive traits such as kid survival as it would lead to a faster rate of gain in reproductive rate than just focusing on number of kids weaned. It was estimated that this would lead to a \$6.75 improvement per doe joined per year compared to the current index.

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# List of abbreviations

AGBU	Animal genetics and breeding unit	LWT	Live weight (kg)
AI	Artificial insemination	MLA	Meat and Livestock Australia
AWT	Adult weight (kg)	MMG	Maternal Meat Goat index (\$)
Boer	Boer goat breed	MWWT	Maternal weaning weight (kg)
BT	Birth type (Single, twin, multiple)	NDK/DJ	Doe fertility (Number of does kidding per doe joined)
BWT	Birth weight (kg)	NKB	Number of kids born per doe joined
CPLUS	Carcase Plus index (\$)	NLB	Number of lambs born per ewe joined
CFA	Cast for age doe	NKW	Number of kids weaned per doe joined
CWT	Hot carcass weight (kg)	NKW/NKB	Literature kid survival estimate
DJ	Number of does joined	NLW	Number of lambs weaned per ewe joined
DP	Dressing percentage (%) (CWT / LWT x 100)	NS	Not significant ( $p \geq 0.05$ )
EBV	Estimated breeding value	P	Post-weaning (7 to 10 months of age)
EMA	Eye muscle area (cm <sup>2</sup> )	PEMD	Post-weaning eye muscle depth (mm)
EMD	Eye muscle depth (mm)	PFAT	Post-weaning C-site fat depth (mm)
ET	Embryo transfer	PWEC	Post-weaning worm egg count (#/gram)
FAT	C-site fat depth (mm)	PWT	Post-weaning weight (kg)
G x E	Genotype by environment	RT	Rearing type (Single, twin, multiple)
HWT	Hogget weight (kg)	RT/BT	Calculated KSV as a trait of the dam
K+	Kid Plus index (\$)	SE	Standard Error
KSV	Kid survival (RT / BT)	SRC	Self-replacing Carcass index (\$)
LM	Lean meat (kg)	WEC	Worm egg count (No. / gram)
LMP	Lean meat production (kg) (LM/DJ)	WWT	Weaning weight (kg)
LMG	Lean Meat Goat index (\$)	Y	Yearling (10 to 13 months of age)
LMY	Lean meat yield (%) (LM/CWT)	YEMD	Yearling eye muscle depth (mm)
LP2020	Lamb 2020 index (\$)	YFAT	Yearling C-site fat depth (mm)
LSB	Litter size at birth (No. kids born per doe kidding)	YWEC	Yearling worm egg count (No. / gram)
		YWT	Yearling weight (kg)

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