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Sheep Breeding & Selection

Ian Byrne
Fred Morley Unit

Why Genetics?

Profitable

Permanent

Cumulative

Free

To Improve Productivity

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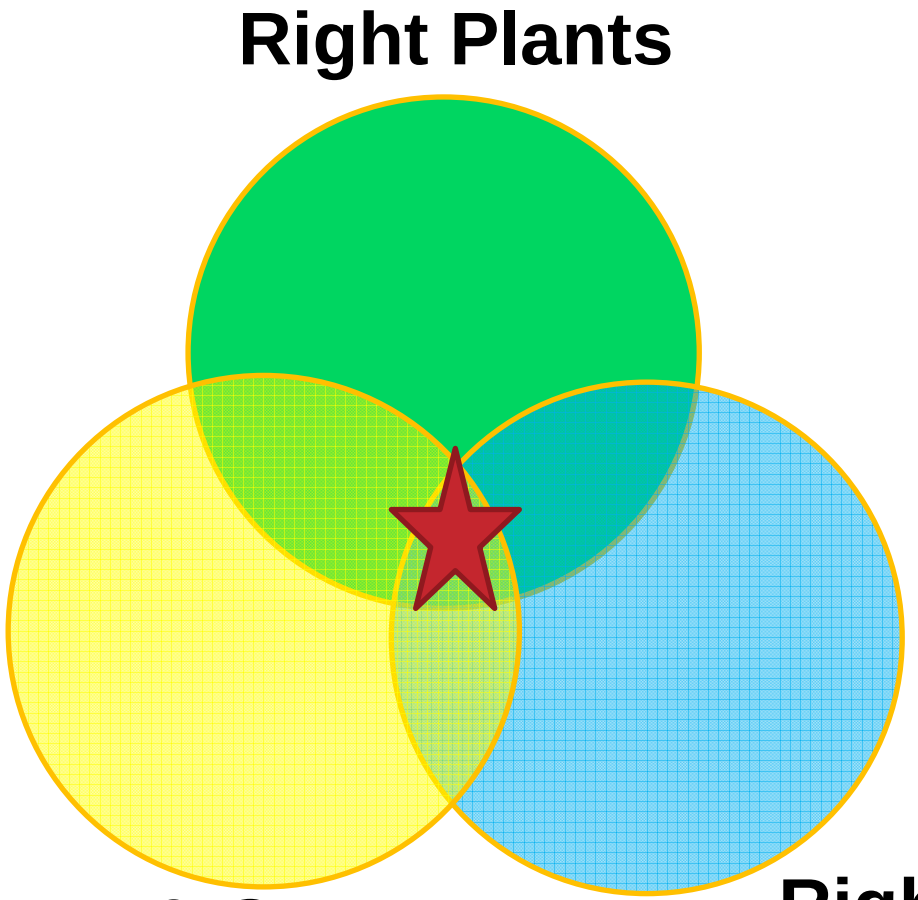
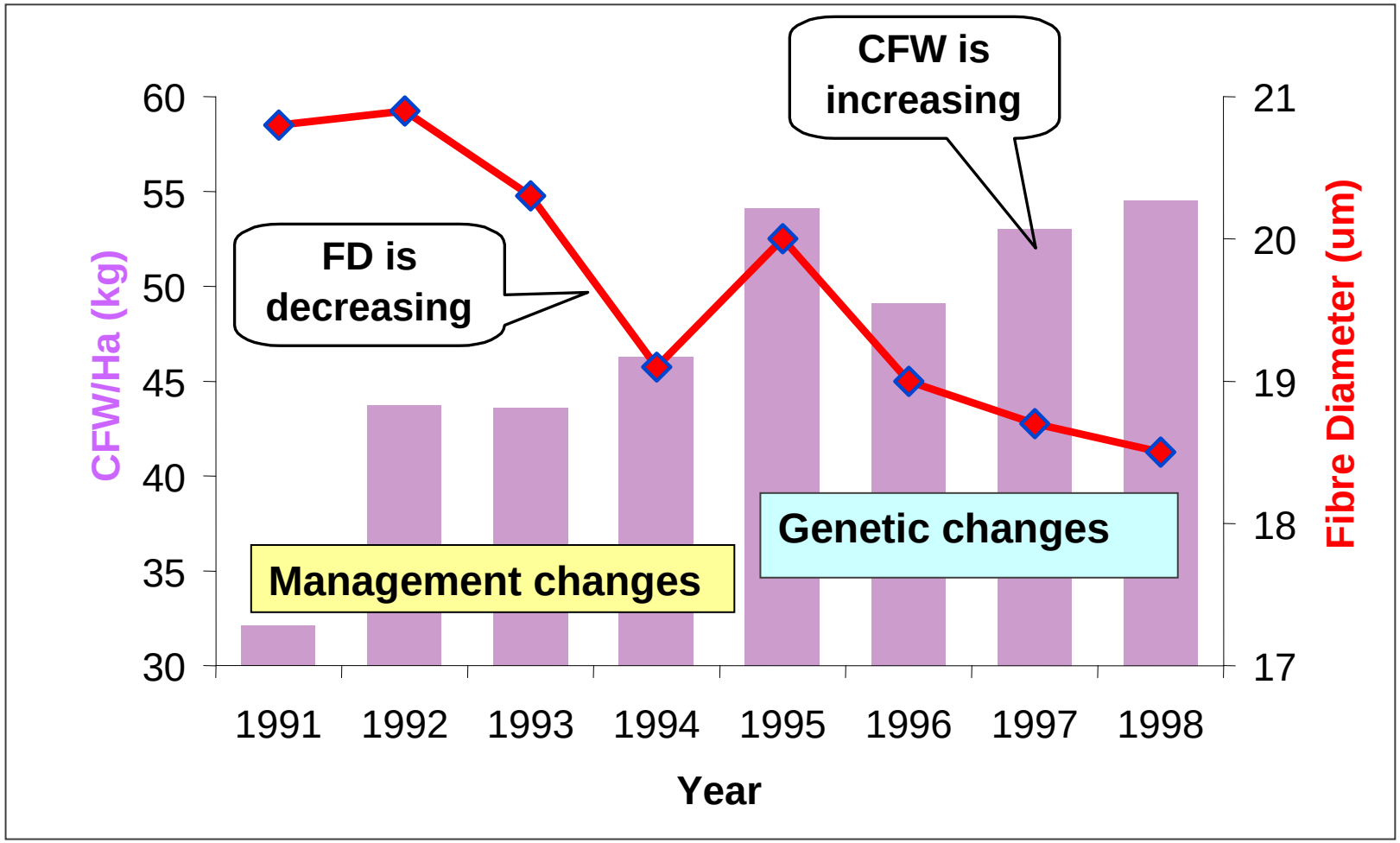


Source SHEEP GENETICS

Production at Roxby Park

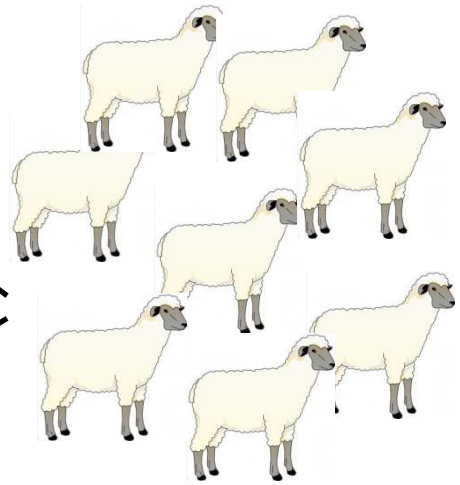


Genetic improvement is largely driven by the rams you buy…

Maternal Great - Grand Sires (1/8th)

Maternal Grand Sires (¼th)

Sires (½th)



7/8th of genetic composition of your lambs is determined by the rams used over the last 3 generations

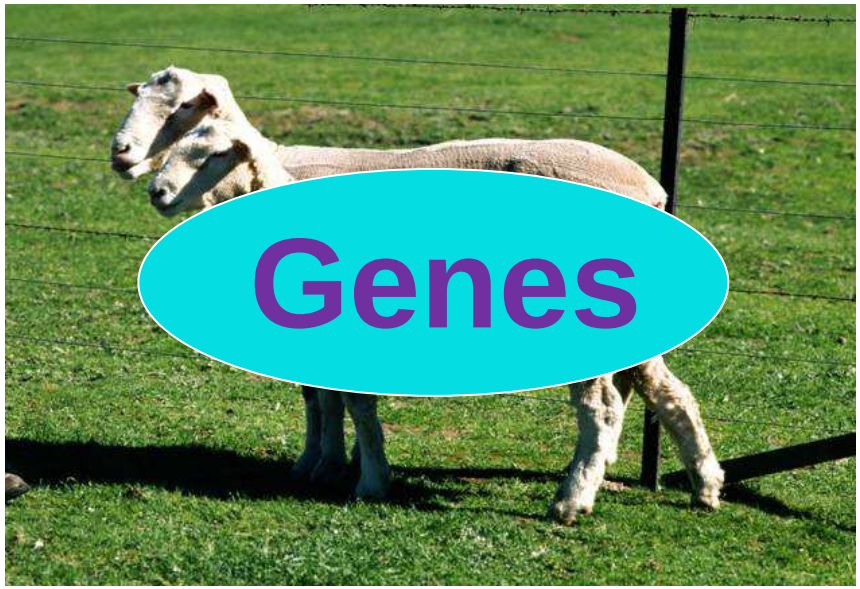
What affects a ram's performance ?

Performance = **Environment** + **Genetics**

Age

Genes

Dam age



Parasites

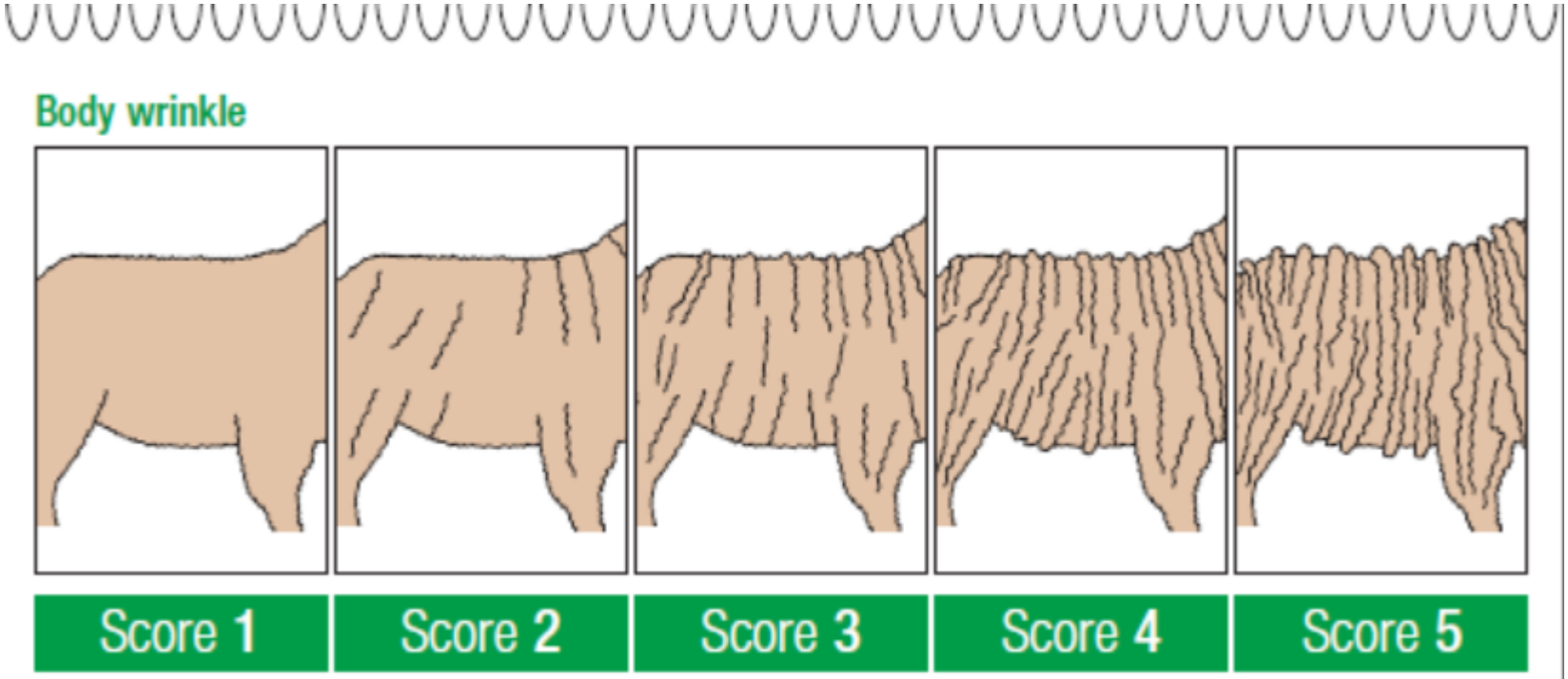
Single

Feed

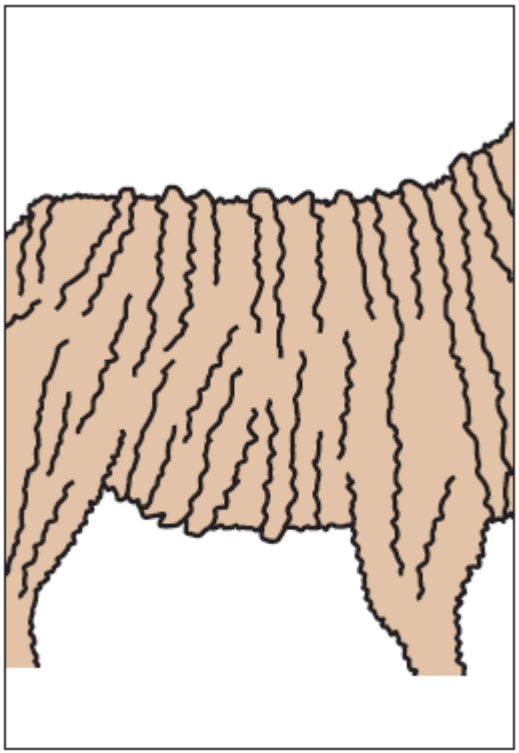
Twin

Source SHEEP GENETICS mla awi

Body Wrinkle Scores



“Feed wrinkle”



What about the effects of environment and nutrition On Wrinkle Score

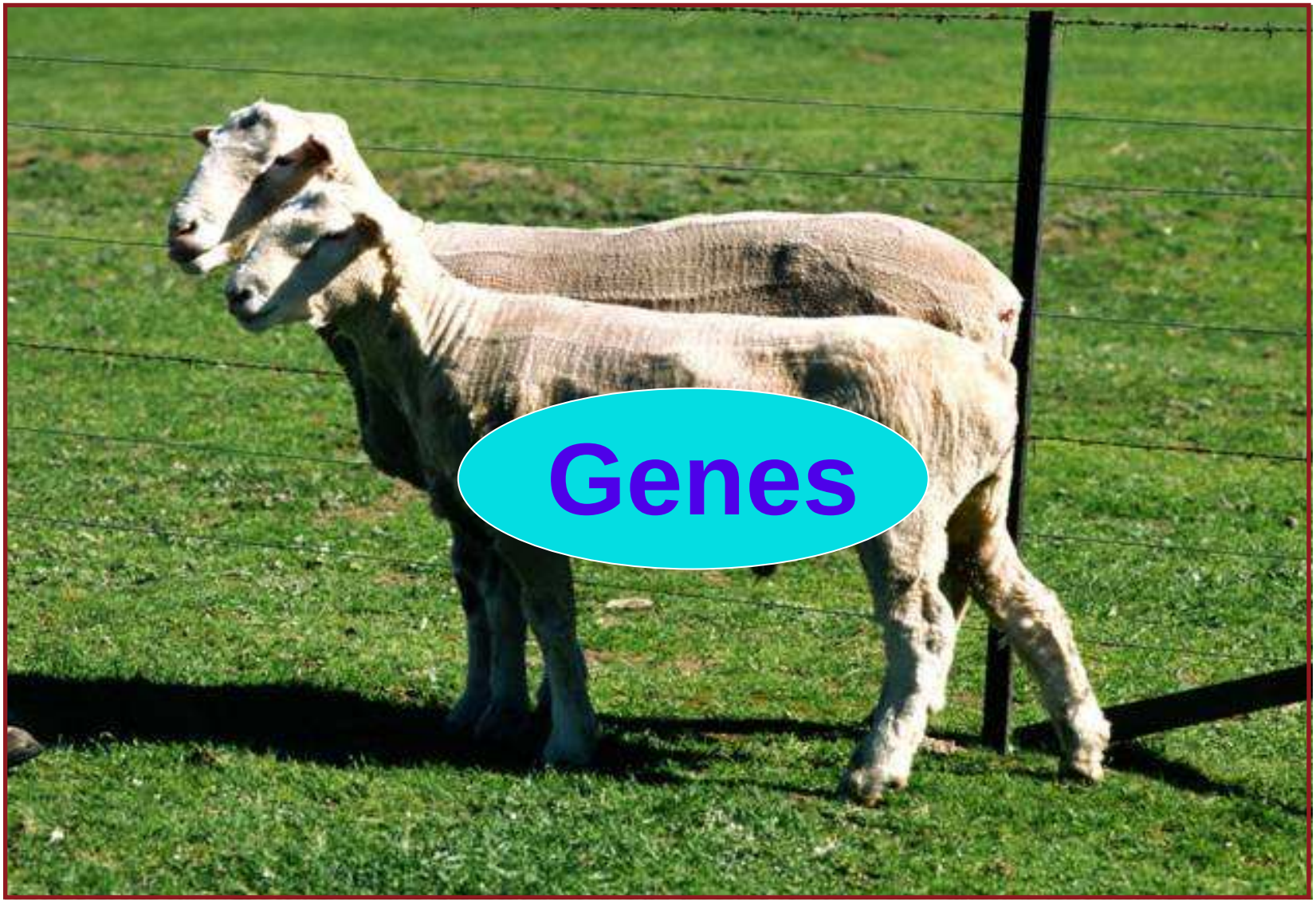
- Single or twin (-0.3 to -0.5)
- Born in a drought (-0.5 to -1.0)
- From a maiden dam (-0.1 to -0.2)

Need to select for genes, NOT nutrition

Source

SHEEP GENETICS

Need to Select for Genes, NOT Environment



The ram buyers challenge

~ 75,000 rams available annually

~ 1200 breeders

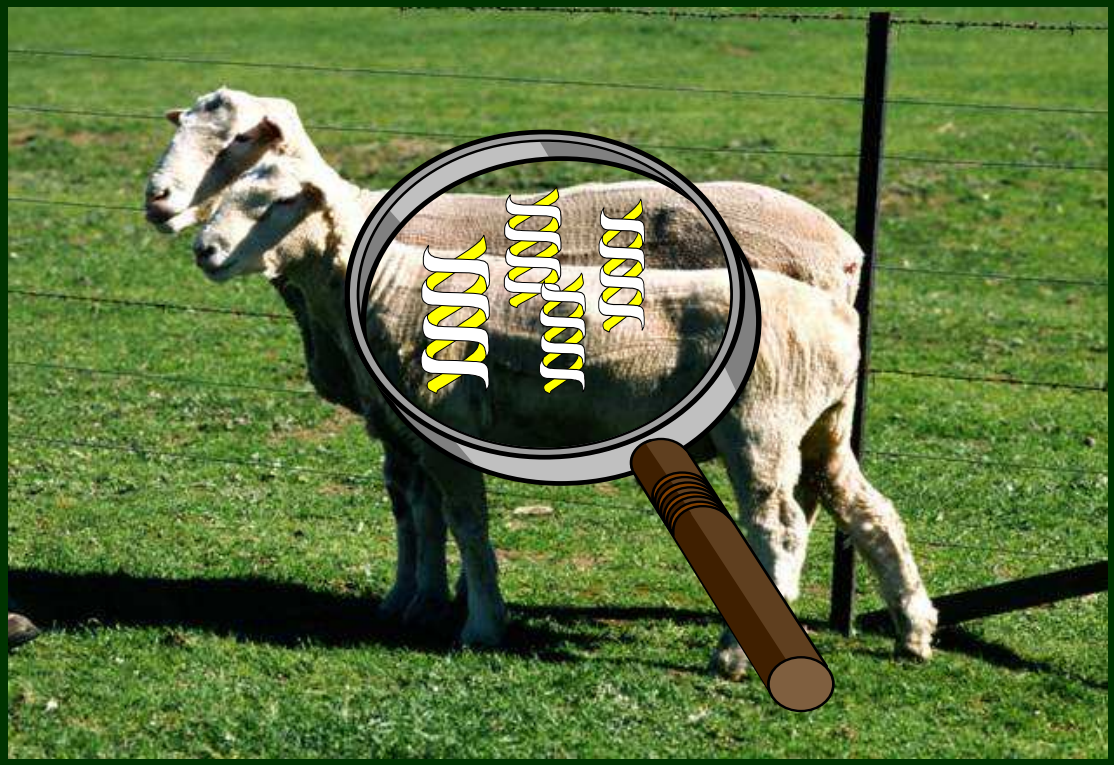
6 - 8 key breeds

Which ram will best suit

- your ***ewe type*** (Merino / DP / 1st X)
- your ***production system*** (Feedlot / pasture)
- your ***market target*** (domestic / export)

Source SHEEP GENETICS mla awi

Problem:
Its difficult to see a ram's genes



But we can Estimate the Sheep Breeding Value

ASBVs

Where do we get the information ?

Numbers in Sheep Genetics Database

SHEEP GENETICS	Flocks 2009/10	Analysis 2009/10	Annual Intake
Terminal	487	1.63 M	107,996
Maternal	112	0.51 M	52,550
Merino	168	1.22 M	83,409
Total	**767**	**3.27 M**	**232,525**

What is a good ASBV?

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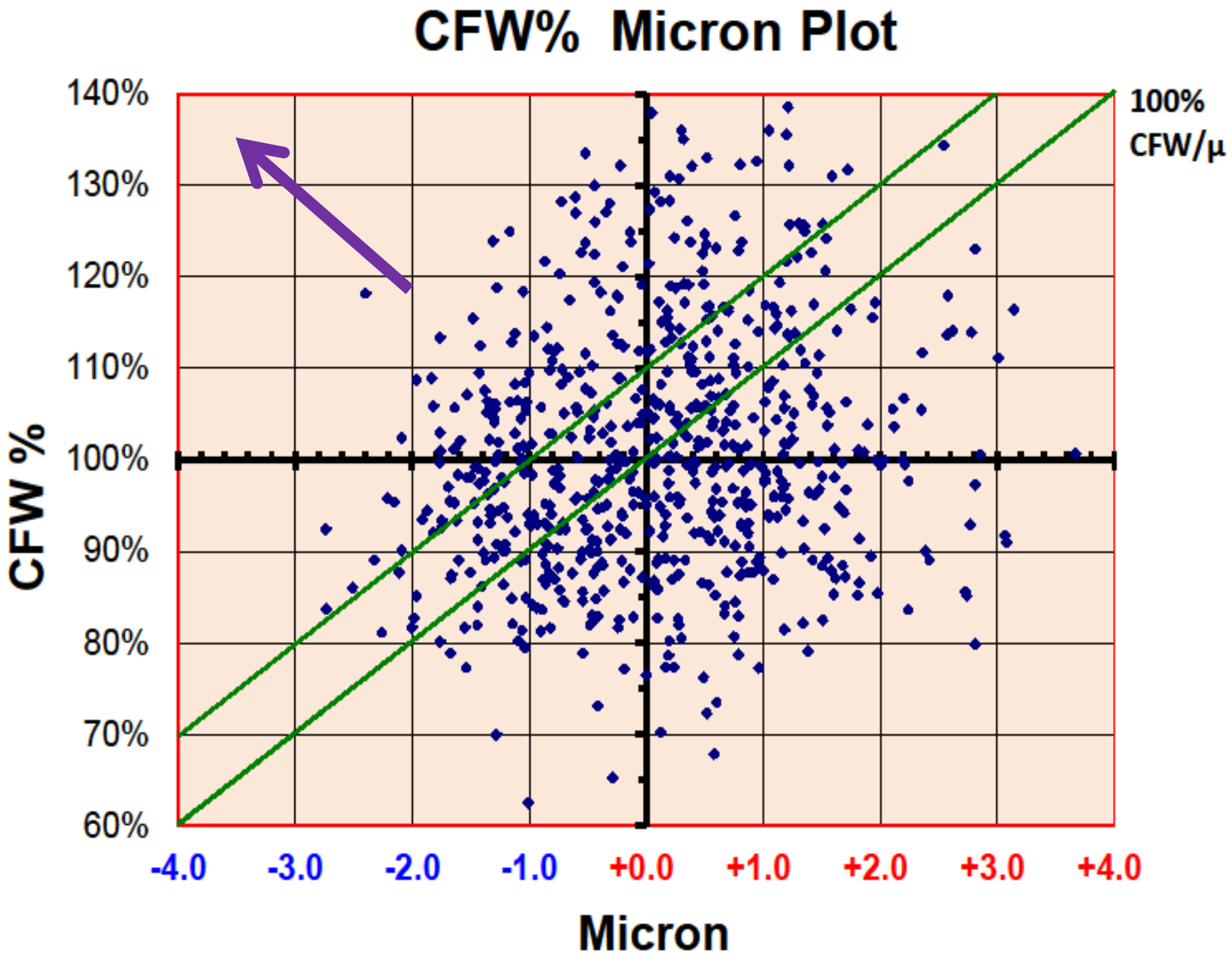
ASBVs are based around 100% or 0

100% is the average of the 1990 drop

ASBVs need to be compared to the current average ASBV


CFW% Micron Plot
140%
130%
120%
110%
100%
90%
80%
70%
60%
CFW %
100%
CFW/µ
-4.0
-3.0
-2.0
-1.0
+0.0
+1.0
+2.0
+3.0
+4.0
Micron

Key Maternal Sire Traits

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Fertility

Maternal capacity – milk & mothering

Growth rate

Wool traits

Carcase value

Worm resistance

Structural traits

Relative importance will vary across breeds & environments

Key ASBVs for Terminal Sires

Growth Traits

Carcase Traits

PEMD – Post weaning eye muscle depth

EMD is positively related to

- loin weight
- muscle in the loin
- muscle in the hind-quarter

Positive muscle with negative fat is even better for feed efficiency in growing lambs

Source Sheep Genetics

Key ASBVs for Terminal Sires cont.

PFAT – Post weaning fat depth

- Tailor fat depth for your market
- Beware of extremes of fatness or leanness

Excess fat is inefficient use of feed

- It takes ~4 times more energy to produce 1kg of fat than it does to produce 1kg of muscle

Leanness can be associated with poor fertility

Source Sheep Genetics

LAMBPLAN Indexes

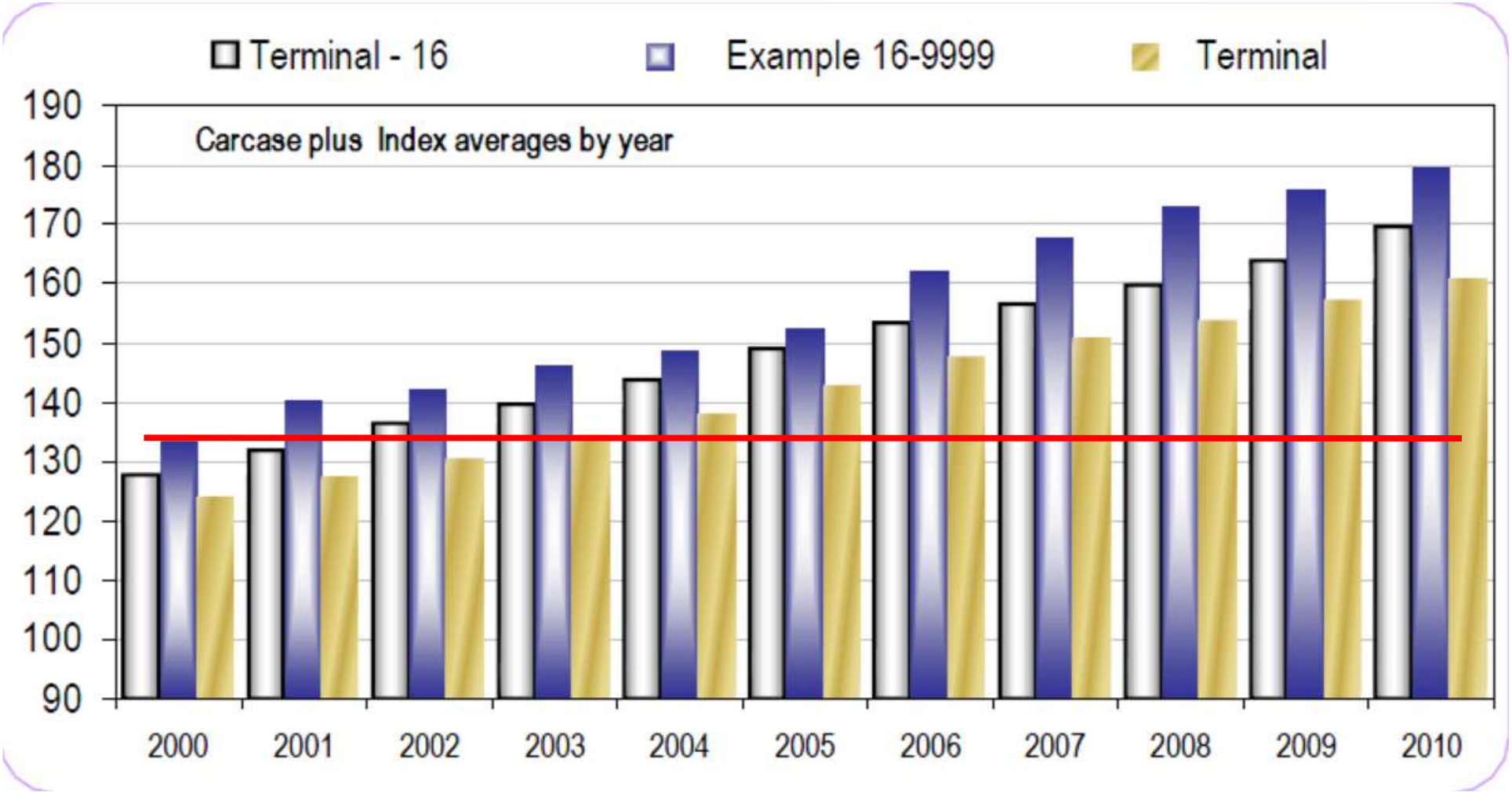
	BWT (kg)	WWT (kg)	PWT (kg)	PFAT (mm)	PEMD (mm)	**WEC (%)**
Carcase Plus			↑	↓	↑	
Lamb 2020	—	↑	↑	—	↑	↓

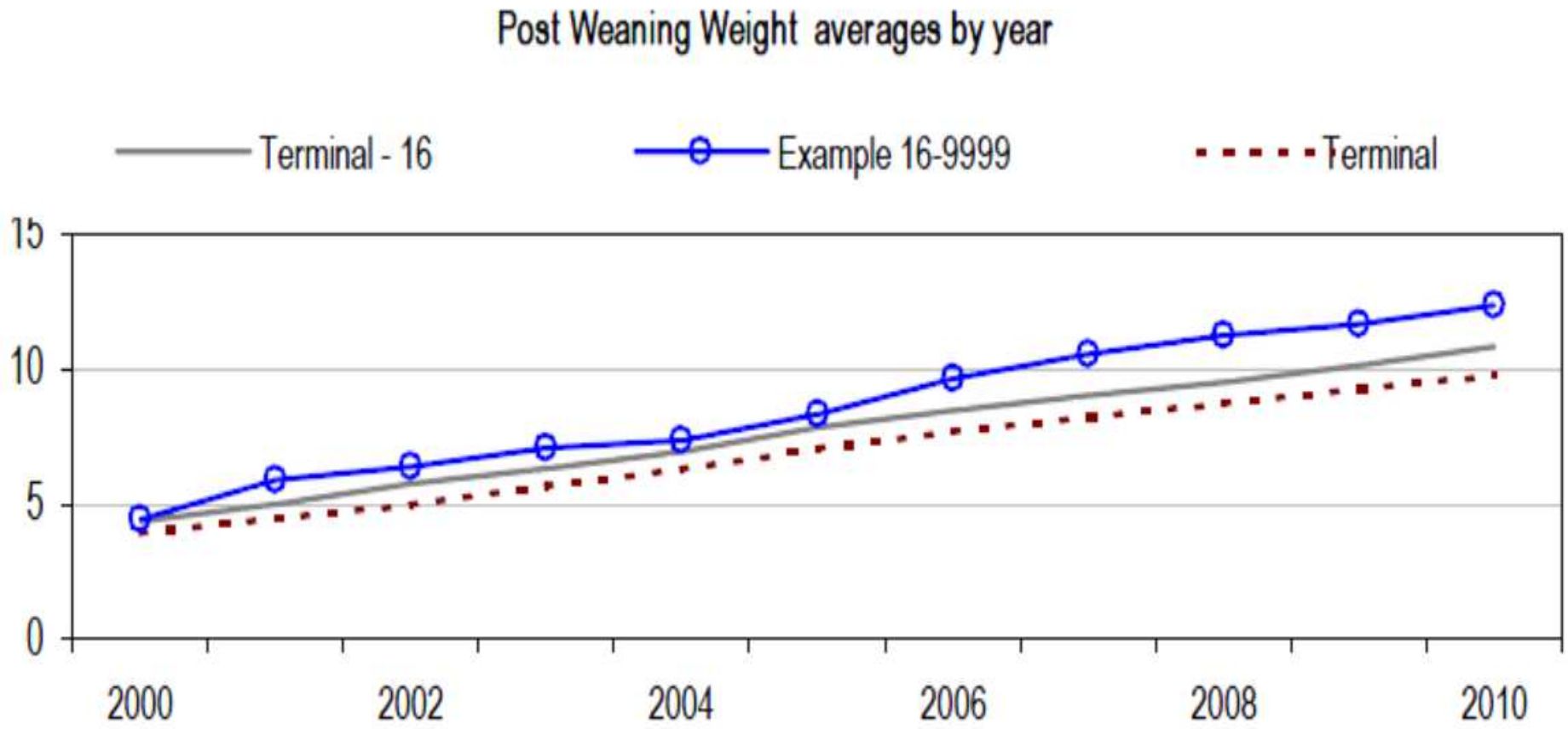
Maintain fat

Reduce WEC

Maintain birthweight

Source Sheep Genetics


Terminal - 16
Example 16-9999
Terminal
Carcase plus Index averages by year
190
180
170
160
150
140
130
120
110
100
90
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010


Post Weaning Weight averages by year
Terminal - 16
Example 16-9999
Terminal
15
10
5
0
2000
2002
2004
2006
2008
2010

What are genetics for Growth worth?

For Current Terminal Sires

Top 10% compared to Average Sires

3 kg heavier

↓

1.5 kg for every lamb sired

↓

Average ram gets 180 lambs per lifetime

↓

270 kgs live weight or $583.20 @ 216 c/kg

Key Merino sire traits

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Wool Quality

Wool Quantity

Fertility

Worm Resistance

Carcase

Breech Strike Resistance

Growth

Merino Select Indexes

	CFW (kg)	FD (um)	SS (N/ktex)	BW (kg)	NLW (%)
10%	↑	↓	↑	↑	—

Increase fleece weight

Reduce fibre diameter

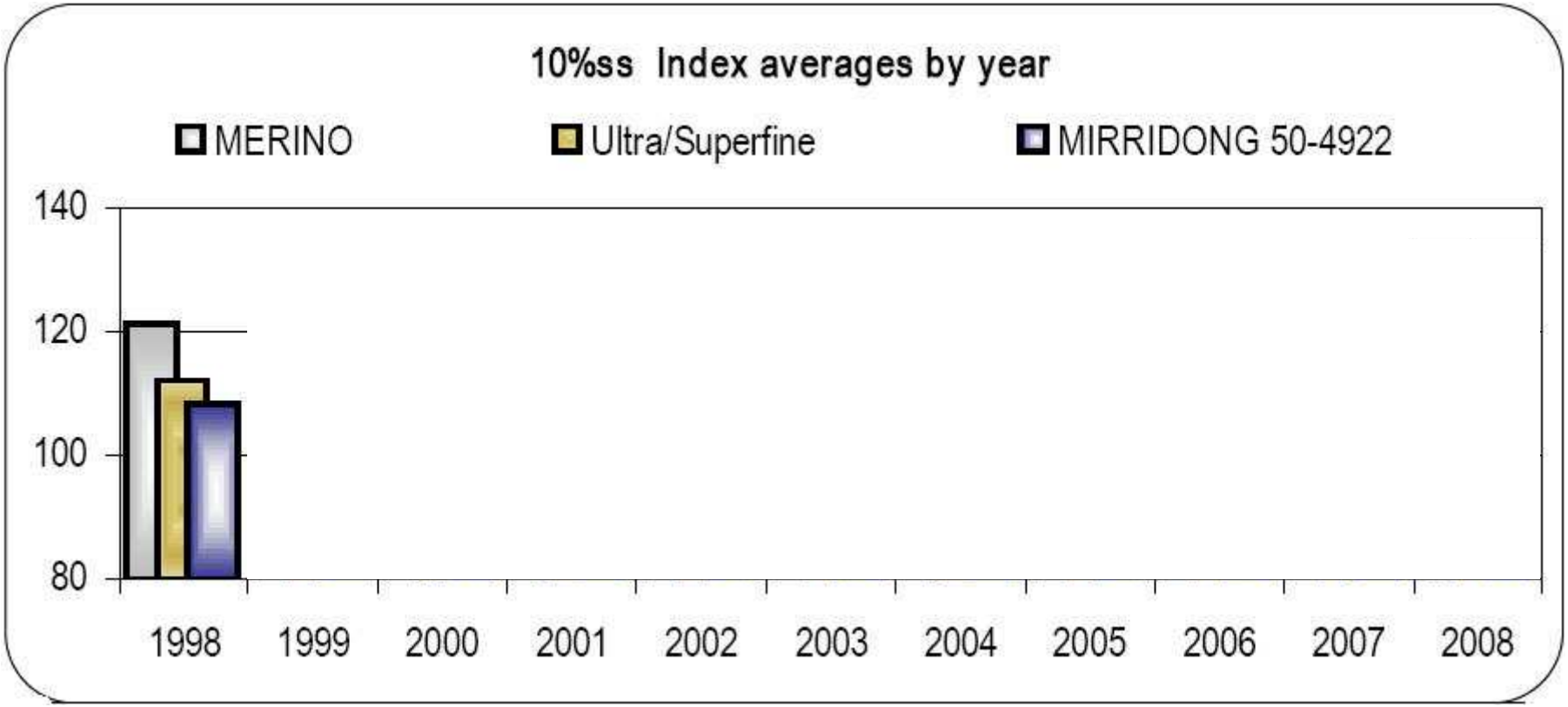
Increase staple strength

Increase body weight

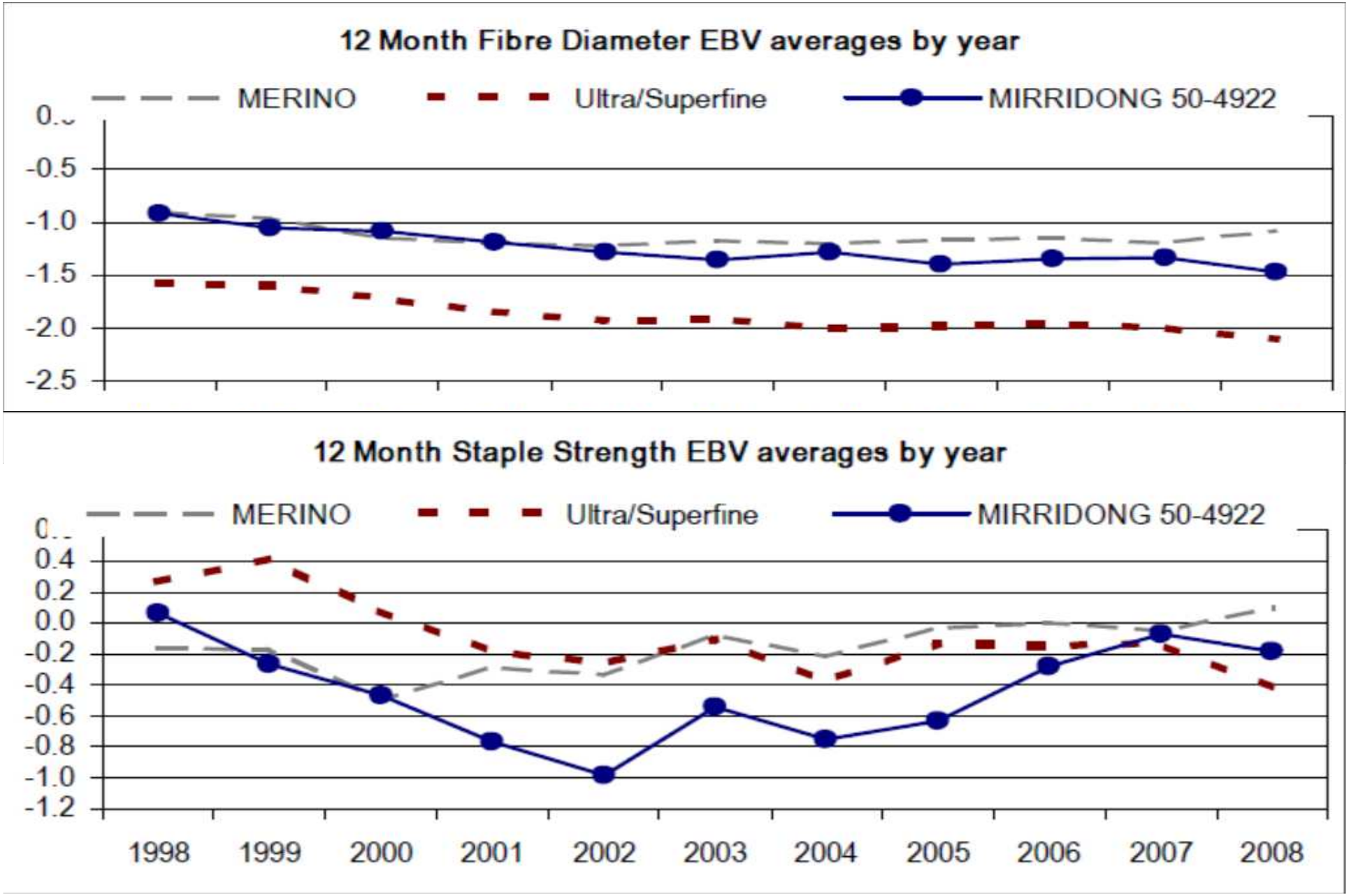
Maintain fertility

Source Sheep Genetics

Mirridong Merinos Genetic Trend



Mirridong Merinos



Maternal traits are the real key

SHEEP GENETICS

- Reproductive rates
- Maternal performance
- Fat and muscle
- Internal parasite resistance (worms)
- Are all traits of major economic importance to your ewe flock, but can't be seen when buying rams.

SHEEP GENETICS

mla MEAT & LIVESTOCK AUSTRALIA

awi Australian Wool Innovation Limited

LAMBPLAN ASBV

MERINOSELECT ASBV

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Sheep Genetics is the national genetic information and evaluation service for the meat and wool sectors of the sheep industry delivered as LAMBPLAN and MERINOSELECT. The purpose of Sheep Genetics is to improve the quality, scope and utilisation of across-flock, and where appropriate, across breed genetic information for the Australian sheep industry.

www.sheepgenetics.org.au

- ASBVs are available across flock and, where appropriate, across breeds
- ASBVs are updated twice monthly for a range of commercially relevant traits that impact on all sectors of the sheep industry
- ASBVs are designed to be used to compare the genetic potential of animals independent of the environment and location

Backed by quality assurance procedures and minimum accuracy standards, Sheep Genetics hosts a database of some 3 million animals, reflecting data from more than 1000 flocks around Australia. Together with the Australian sheep industry, MLA and AWI have facilitated genetic evaluation for prime lamb and wool producers.

Breeding the right lamb every time

Performance = **Environment** + **Genetics**

Put them on the ground….

Make sure they live….

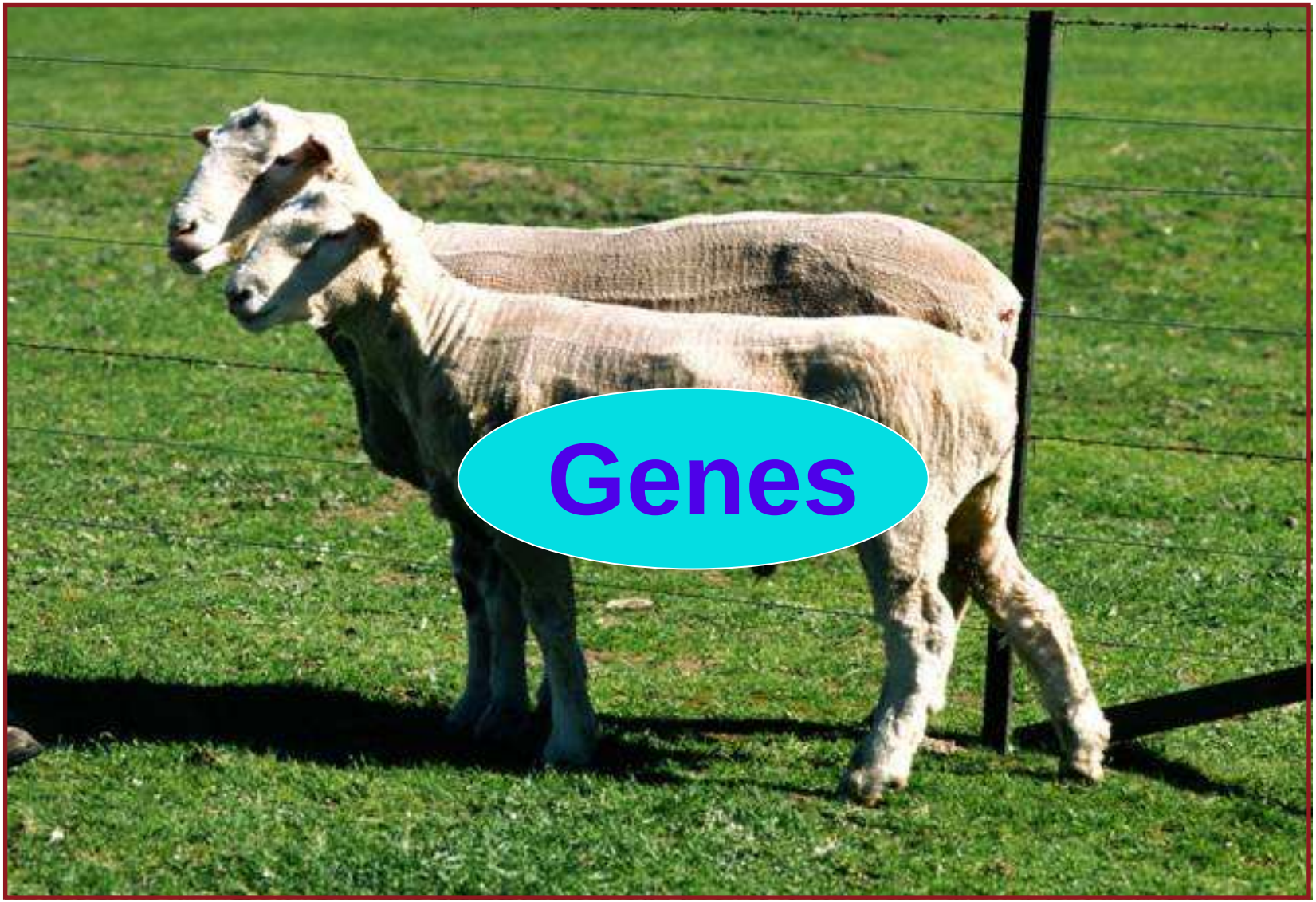
Make sure they eat OK!

Make them grow…

Get the carcase right and high yields

Source Sheep Genetics

Need to Select for Genes, NOT Environment



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Why Genetics?

Free & Profitable

Permanent

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Sheep Breeding & Selection

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Percentile Report

Analysis **TERMINAL** Dated **15/07/2010**

Animals born in 2009

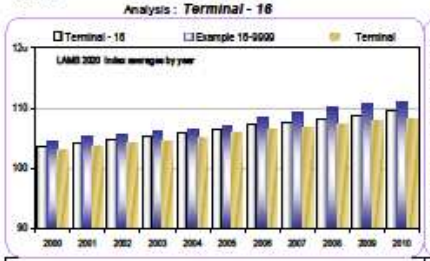
Band	Bwt kg	Wwt kg	PWwt kg	Ywt kg	Pfat mm	Yfat mm	Pemd mm	Yemd mm	Ysc cm	Hsc cm	Pfec %	Yfec %	MWwt kg	NLW %	Carcase +	LAMB2020	Trade$	Export$
0	-0.81	12.5	18.2	19.0	-3.4	-3.8	4.8	5.3	4.8	3.5	-72	-65	5.2	24	222.6	117.3	118.3	122.9
1	-0.48	9.8	15.0	16.1	-1.8	-1.9	2.8	2.8	4.0	3.2	-55	-52	3.6	13	199.3	113.2	113.7	119.1
2	-0.43	9.4	14.5	15.6	-1.7	-1.8	2.6	2.5	3.8	3.1	-50	-48	3.4	12	195.9	112.6	113.2	118.5
3	-0.39	9.2	14.2	15.3	-1.6	-1.7	2.4	2.3	3.7	3.0	-48	-46	3.3	11	193.7	112.3	112.9	118.0
4	-0.36	9.0	13.9	15.1	-1.5	-1.6	2.3	2.1	3.7	3.0	-46	-44	3.2	10	192.1	112.0	112.6	117.7
5	-0.32	8.9	13.7	14.9	-1.4	-1.6	2.2	2.0	3.6	2.9	-44	-42	3.1	10	190.7	111.8	112.4	117.5
10	-0.08	8.4	13.0	14.2	-1.3	-1.4	1.8	1.7	3.4	2.8	-38	-36	2.9	8	185.8	111.1	111.7	116.5
15	0.08	8.1	12.6	13.7	-1.2	-1.3	1.6	1.5	3.3	2.7	-34	-31	2.7	7	182.3	110.5	111.2	115.8
20	0.15	7.8	12.2	13.3	-1.1	-1.2	1.4	1.3	3.2	2.6	-30	-28	2.6	7	179.4	110.1	110.8	115.2
25	0.19	7.6	11.8	12.9	-1.0	-1.1	1.3	1.1	3.1	2.5	-27	-25	2.5	6	176.8	109.7	110.5	114.7
30	0.22	7.4	11.5	12.6	-0.9	-1.0	1.1	1.0	3.0	2.5	-24	-22	2.4	5	174.4	109.4	110.1	114.3
35	0.25	7.2	11.1	12.2	-0.9	-0.9	1.0	0.9	2.9	2.4	-21	-19	2.2	5	172.2	109.1	109.8	113.8
40	0.27	7.0	10.8	11.9	-0.8	-0.9	0.9	0.8	2.9	2.3	-18	-16	2.2	4	169.8	108.7	109.4	113.3
45	0.30	6.8	10.5	11.6	-0.7	-0.8	0.8	0.7	2.8	2.3	-16	-14	2.1	4	167.4	108.4	109.1	112.9
50	0.32	6.5	10.1	11.2	-0.7	-0.8	0.7	0.6	2.7	2.2	-13	-11	2.0	3	164.9	108.1	108.8	112.4
55	0.34	6.3	9.8	10.8	-0.6	-0.7	0.6	0.5	2.7	2.1	-10	-9	1.9	3	162.3	107.8	108.4	111.9
60	0.36	6.0	9.4	10.4	-0.6	-0.6	0.5	0.4	2.6	2.0	-7	-6	1.8	2	159.6	107.5	108.1	111.4
65	0.38	5.7	9.0	10.0	-0.5	-0.6	0.4	0.3	2.5	2.0	-4	-3	1.6	2	156.7	107.1	107.7	110.8
70	0.40	5.4	8.5	9.5	-0.4	-0.5	0.3	0.2	2.4	1.9	-1	0	1.5	1	153.6	106.8	107.3	110.2
75	0.42	5.0	8.0	8.9	-0.4	-0.4	0.2	0.1	2.3	1.8	3	3	1.4	1	150.5	106.4	106.9	109.6
80	0.44	4.6	7.5	8.2	-0.3	-0.3	0.1	0.0	2.2	1.6	7	7	1.3	0	147.0	106.0	106.4	108.8
85	0.47	4.1	6.9	7.4	-0.2	-0.2	0.0	-0.2	2.0	1.5	12	11	1.1	-1	143.0	105.4	105.9	108.0
90	0.51	3.4	6.1	6.3	0.0	0.0	-0.2	-0.4	1.8	1.2	18	17	0.9	-3	138.1	104.7	105.0	107.0
95	0.56	2.4	4.7	4.8	0.2	0.3	-0.5	-0.6	1.5	0.9	29	27	0.5	-5	128.6	103.4	103.4	105.2
100	1.01	-7.5	-12.6	-11.6	3.5	3.1	-5.0	-5.3	-0.9	0.5	119	107	-3.1	-21	37.4	90.3	79.2	77.9

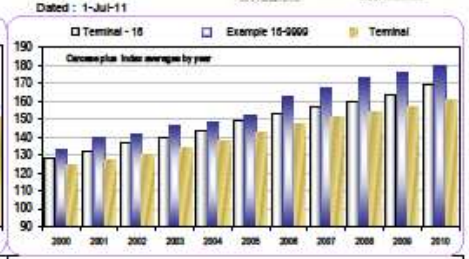
SHEEP GENETICS

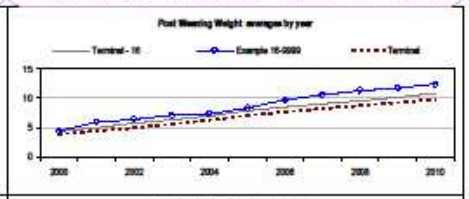
Example Flock
16-9999

Analysis : *Terminal - 16*

Dated : 1-Jul-11





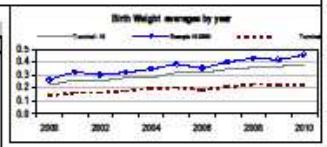


Terminal - 16

	Bwt	Wwt	Pwwt	Pfat	Pemd	LAMB2020	Carcase +	Counts
2001	0.26	3.46	5.03	-0.34	0.42	104.2	131.8	34898
2002	0.25	3.94	5.73	-0.43	0.48	104.9	136.4	35320
2003	0.28	4.35	6.33	-0.50	0.48	105.3	139.7	37110
2004	0.28	4.77	6.96	-0.57	0.52	105.9	143.7	43281
2006	0.32	5.33	7.85	-0.64	0.57	106.6	149.0	45386
2006	0.32	5.70	8.45	-0.68	0.70	107.2	153.5	47561
2007	0.35	6.05	9.00	-0.73	0.70	107.6	156.5	45125
2008	0.36	6.39	9.54	-0.77	0.74	108.1	159.9	46254
2009	0.37	6.74	10.13	-0.80	0.83	108.6	163.9	43563
2010	0.38	7.17	10.85	-0.79	1.04	109.4	169.7	35550

Example 16-9999

	Bwt	Wwt	Pwwt	Pfat	Pemd	LAMB2020	Carcase +	Counts
2001	0.32	4.05	5.89	-0.39	0.74	105.4	140.0	317
2002	0.30	4.46	6.40	-0.38	0.68	105.6	142.0	283
2003	0.32	4.72	7.05	-0.32	0.79	106.2	146.0	367
2004	0.35	5.07	7.39	-0.32	0.85	106.6	148.6	458
2006	0.38	5.74	8.30	-0.77	0.59	107.1	152.2	445
2006	0.36	6.42	9.62	-0.80	0.89	108.4	162.1	420
2007	0.40	7.08	10.59	-0.79	0.94	109.2	167.5	408
2008	0.43	7.26	11.22	-0.79	1.19	110.1	173.0	480
2009	0.42	7.60	11.65	-0.84	1.23	110.7	175.9	494
2010	0.46	8.06	12.33	-0.83	1.24	111.1	179.4	519



LAMBPLAN reports are prepared using data supplied by breeders and/or accredited operators. LAMBPLAN cannot guarantee the accuracy of this data. LAMBPLAN ASBV's are designed to estimate genetic merit of animals from the data supplied. The reports are provided to assist breeders but no liability is accepted for the outcome resulting from the use of this information.

Linkage Summary	
BRUAN 16-3828	
	Inked
Wts	Yes
Carcase	Yes
FEC	Yes
Reproduction	Yes
Site Code	169999

LAMBPLAN ASBV

Phone 02 6773 2948
www.lambplan.com

Single verses Triplet

Source