

COMBINED EFFECTS OF ZILMAX[®] AND EXOGENOUS GROWTH IMPLANTS IN CATTLE AND SHEEP



TARLETON
STATE UNIVERSITY™
Member of The Texas A&M University System

Prof Edward Webb

Department of Animal Science, Tarleton State University, Texas A&M
University System, Texas, USA, Email: ewebb@tarleton.edu

&

Department of Animal Science, NAS, University of Pretoria, RSA,
Email: edward.webb@up.ac.za



UNIVERSITEIT VAN PRETORIA
UNIVERSITY OF PRETORIA
YUNIBESITHI YA PRETORIA

World Population

1986 - 5 Billion
1998 - 6 Billion
2011 - 7 Billion
2024 - 8 Billion
2039 - 9 Billion
2061 - 10 Billion

OVERLOADED!

THE EARTH CANNOT FEED
YOU ANY MORE.



HUMAN POPULATION GROWTH

ECOLOGY

“IN ORDER TO
STABILIZE
WORLD POPULATION,
WE MUST ELIMINATE
350,000 PEOPLE
PER DAY.”

The Fresh Quotes

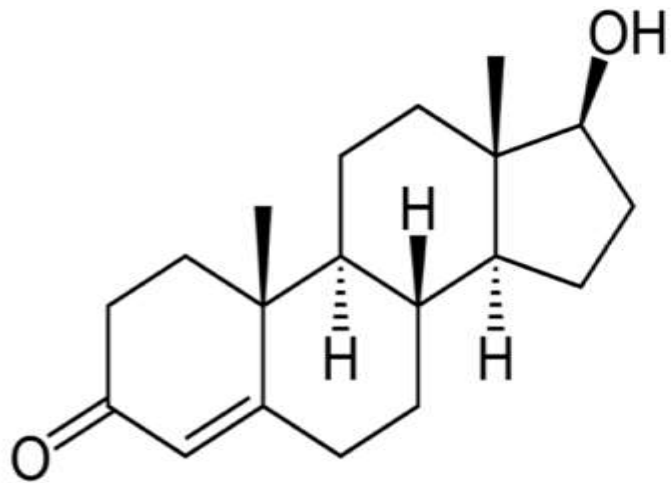


Fig. 1.1 Testosterone

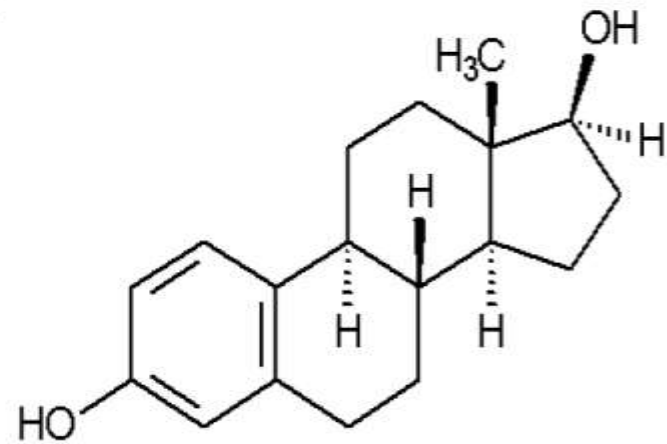


Fig. 1.2 Estradiol 17 β



1. EFFECTS OF EXOGENOUS GROWTH IMPLANTS + ZILMAX®



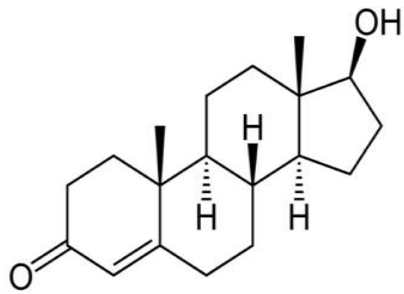


Fig. 1.1 Testosterone

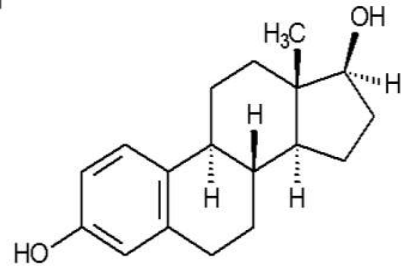
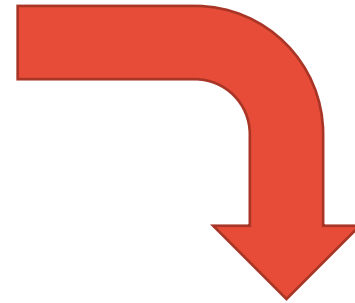
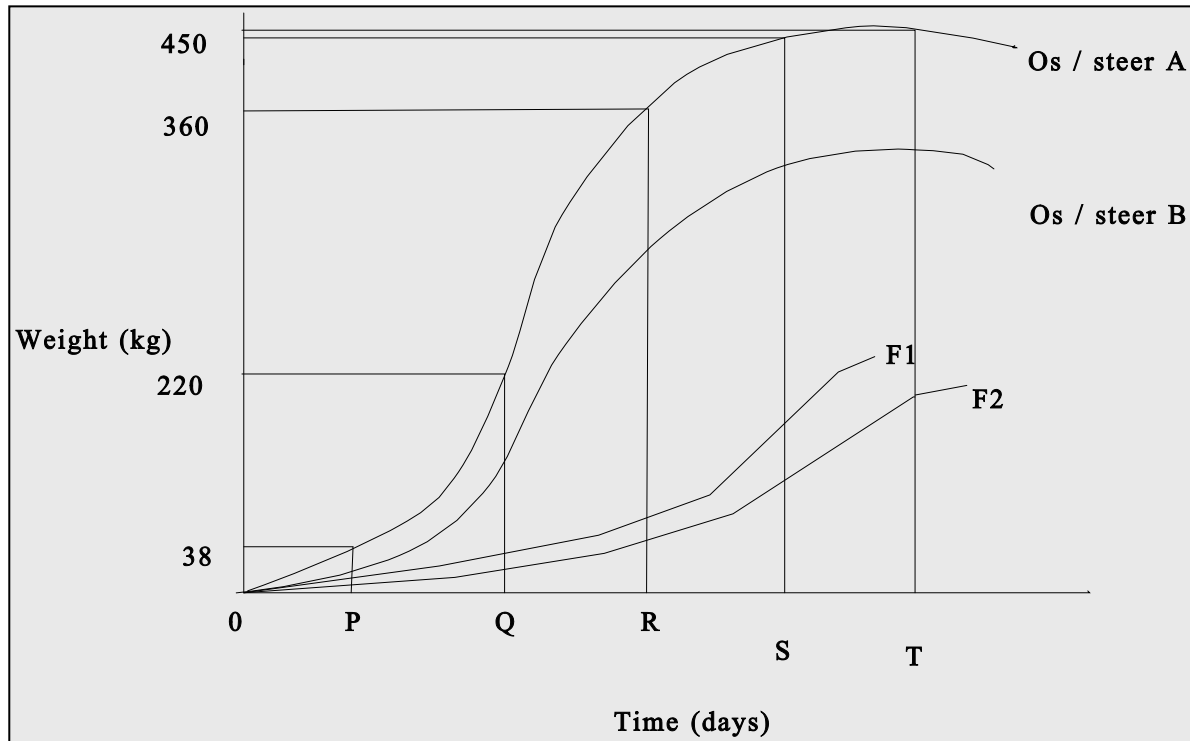


Fig. 1.2 Estradiol 17β



Anabolic effects decrease with increasing fattening



REVALOR H+H + ZILMAX STUDY: 2020 (BC)

Treatment (n=60)	Total kg fed (kg) Mean ± SD	Average DM intake (kg/d) Mean ± SD	FCR	ADG
Control	1506.5 ± 79.00 ^a	11.159 ± 0.585 ^a	6,526	1,709
Zilmax	1349.3 ± 91.77 ^b	11.104 ± 0.699 ^b	5,775	1,824
Δ Z x C	-10,43%	-5,57%	-11,5%	+6,7%

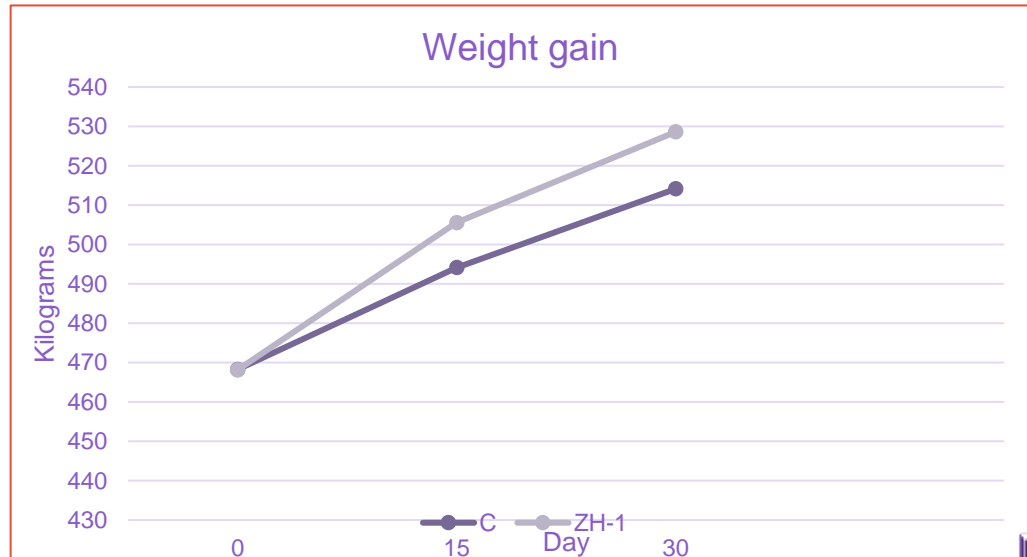
Webb et al., 2019; Zilmax yield study



REVALOR H+H + ZILMAX

Feedlot performance Parameter	C (n=30)	ZH-1 (n=30)	Sign. (p<0,05)
Start weight: Phase 1 (kg)	468.2±30.08	468.1±34.98	NS
Finish weight (kg): Phase 3	514.1±40.47	528.6±44.84	NS
ADG(Kg)	1.529 ^a ±.691	2.093 ^b ±.916	*
FCR#	5.35±0.827	4.59±1.549	NS

Morris, Webb, Morris & Du Toit, 2021
Zilmax in “Low energy” diet.



EGM EFFECTS IN CATTLE: DATA FROM THE US

Table 1. Performance of Heifers implanted with Revalor-XR, Revalor-XH, Revalor-200 on day 1 or day 70 compared to non-implanted heifers

	Treatments ¹					P-Values				
	Control	Rev-XR	Rev-XH	Rev-200 d 1	Rev-200 d 70	SEM	F-Test	Control vs Implant	Rev-XR vs Rev-200 d 70	Rev-XH vs Rev 200 d 70
<i>Carcass-Adjusted Performance</i>										
Initial BW, lb	618	617	618	617	617	8.3	1.00	0.94	0.99	0.95
Final BW, lb ²	1234	1275	1276	1277	1273	12.5	0.09	<0.01	0.90	0.87
DMI, lb/d	21.3	21.5	22.1	21.8	21.7	0.26	0.22	0.12	0.47	0.28
ADG, lb ³	3.12 ^a	3.34 ^b	3.34 ^b	3.34 ^b	3.33 ^b	0.39	<0.01	<0.01	0.84	0.86
F:G ⁴	6.80 ^a	6.41 ^c	6.62 ^b	6.54 ^{bc}	6.54 ^{bc}	—	<0.01	0.02	0.21	0.29
<i>Live Performance</i>										
Final BW, lb ⁵	1241	1277	1278	1270	1270	12.9	0.26	0.03	0.69	0.67
ADG, lb ⁶	3.16 ^a	3.35 ^b	3.34 ^b	3.31 ^b	3.31 ^b	0.044	0.02	<0.01	0.55	0.59
F:G ⁴	6.76 ^a	6.41 ^b	6.62 ^a	6.58 ^{ab}	6.54 ^{ab}	—	0.02	0.01	0.13	0.54

^{a-c} Means with different superscripts differ (P<0.05)

¹ Treatments include: Control-no implant; Rev-XR–Revalor-XR on day 1 (200 mg TBA and 20 mg E, coated pellets); Rev-XH–Revalor-XH on day 1 (200 mg TBA and 20 mg E, partially coated pellets); Rev-200 d 1–Revalor-200 (200 mg TBA and 20 mg E, uncoated pellets) administered on day 1; Rev-200 d 70–Revalor-200 implanted on day 70.

² Calculated from HCW divided by a common dressing percent (63%)

³ Calculated using carcass-adjusted final BW

⁴ Analyzed as G:F, the reciprocal of F:G

⁵ Live final BW measured by weighing cattle on pen

Ohnoutka et al, 2018; Nebraska Beef Cattle Report & in Applied Animal Science 37:41–51



SUMMARY OF EGM + ZILMAX EFFECTS IN FEEDLOT CATTLE

1. EGM enhance muscle and fat growth by exploitation of “efficient growth phase”
2. Zilmax most effective as fattening increases
3. Ideal combination of “Start-up” EGM + “Finishing” Zilmax treatment
4. EGM + Zilmax have additive effects

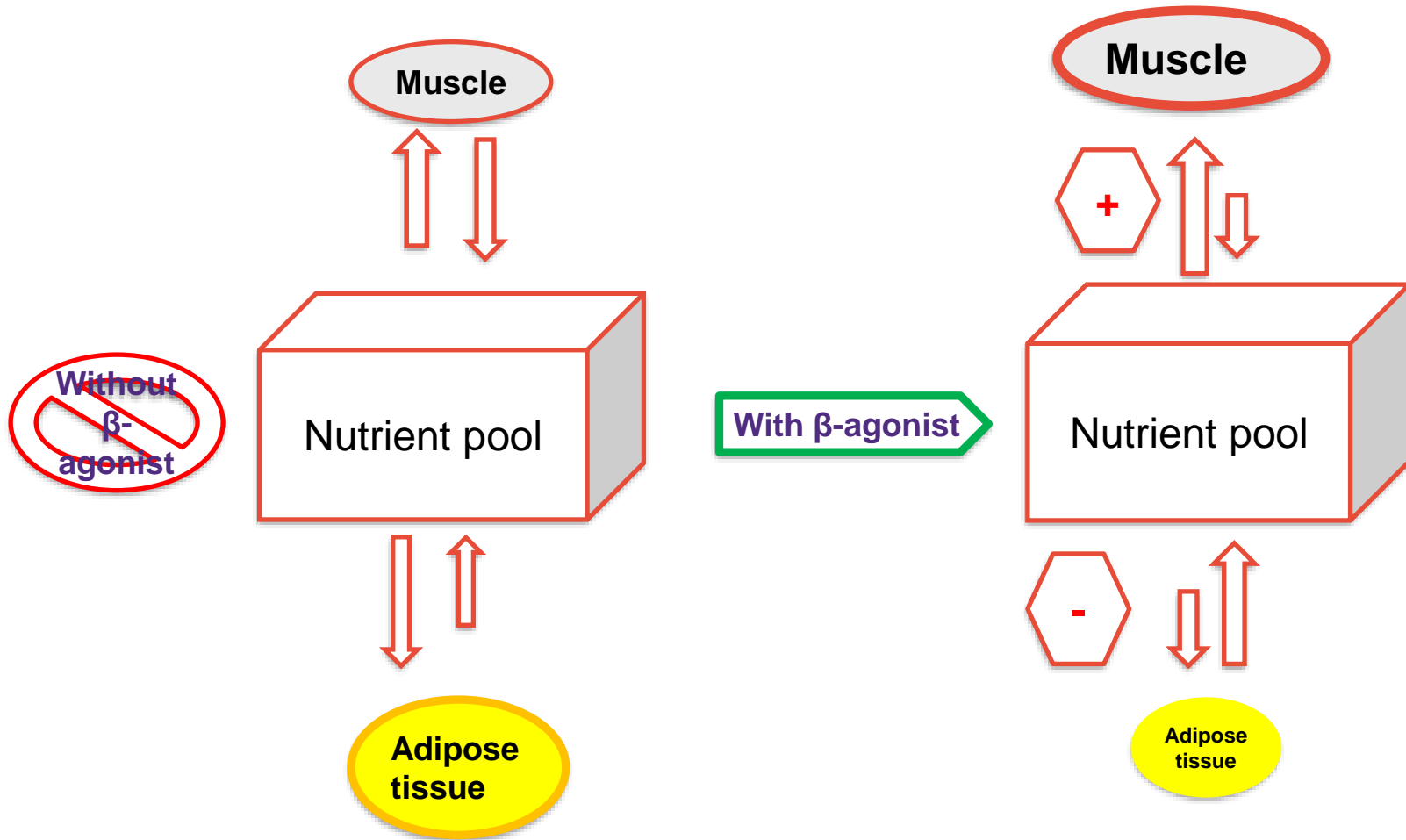
EGM +  **zilmax**[®] = profit



2. EFFECTS OF ZILMAX IN SHEEP

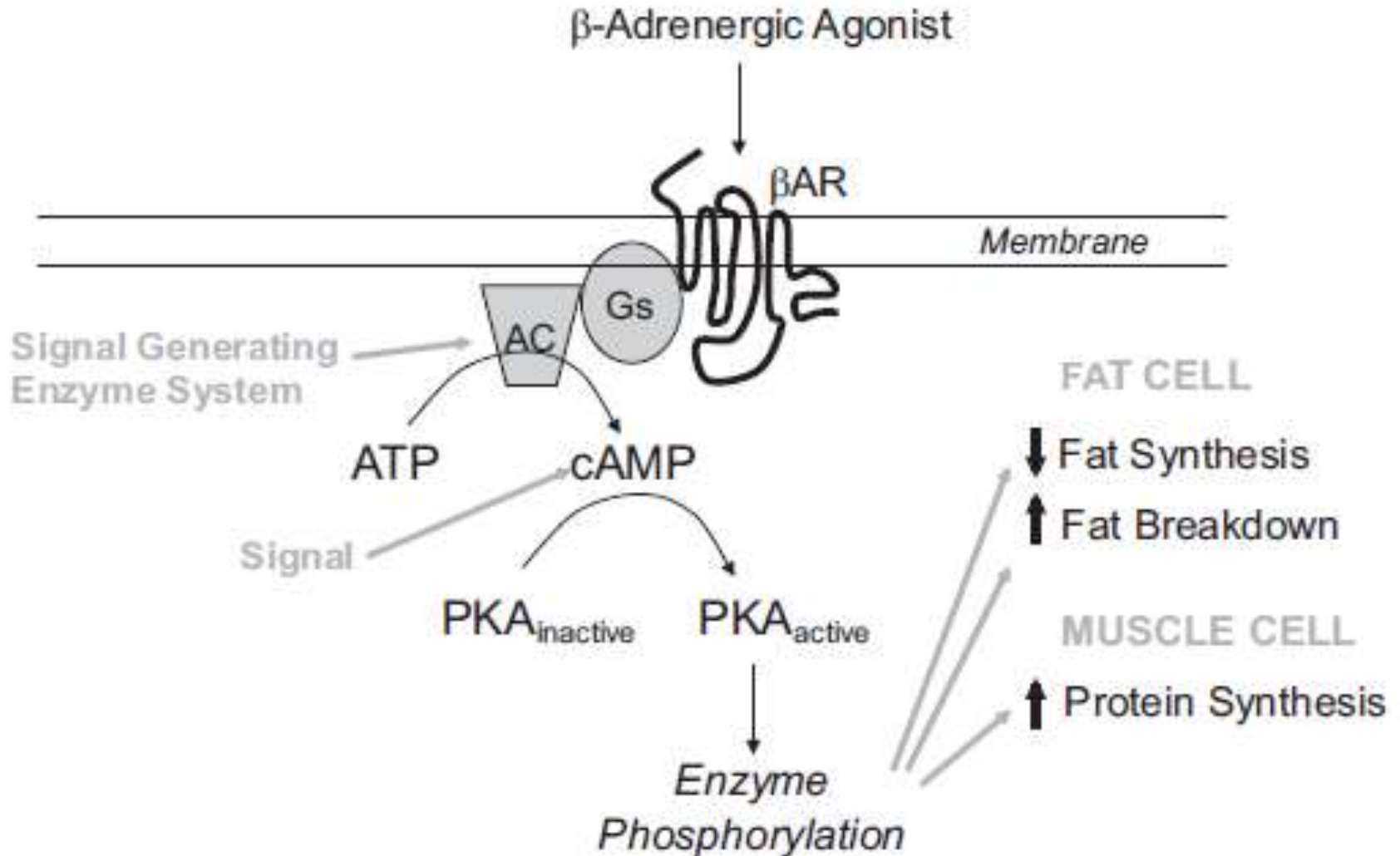


PHYSIOLOGICAL EFFECTS OF B-ADRENERGIC AGONISTS ON TISSUE METABOLISM



MECHANISM OF SIGNAL TRANSDUCTION OF β -ADRENERGIC AGONISTS

(FROM MOODY ET AL., 2000)

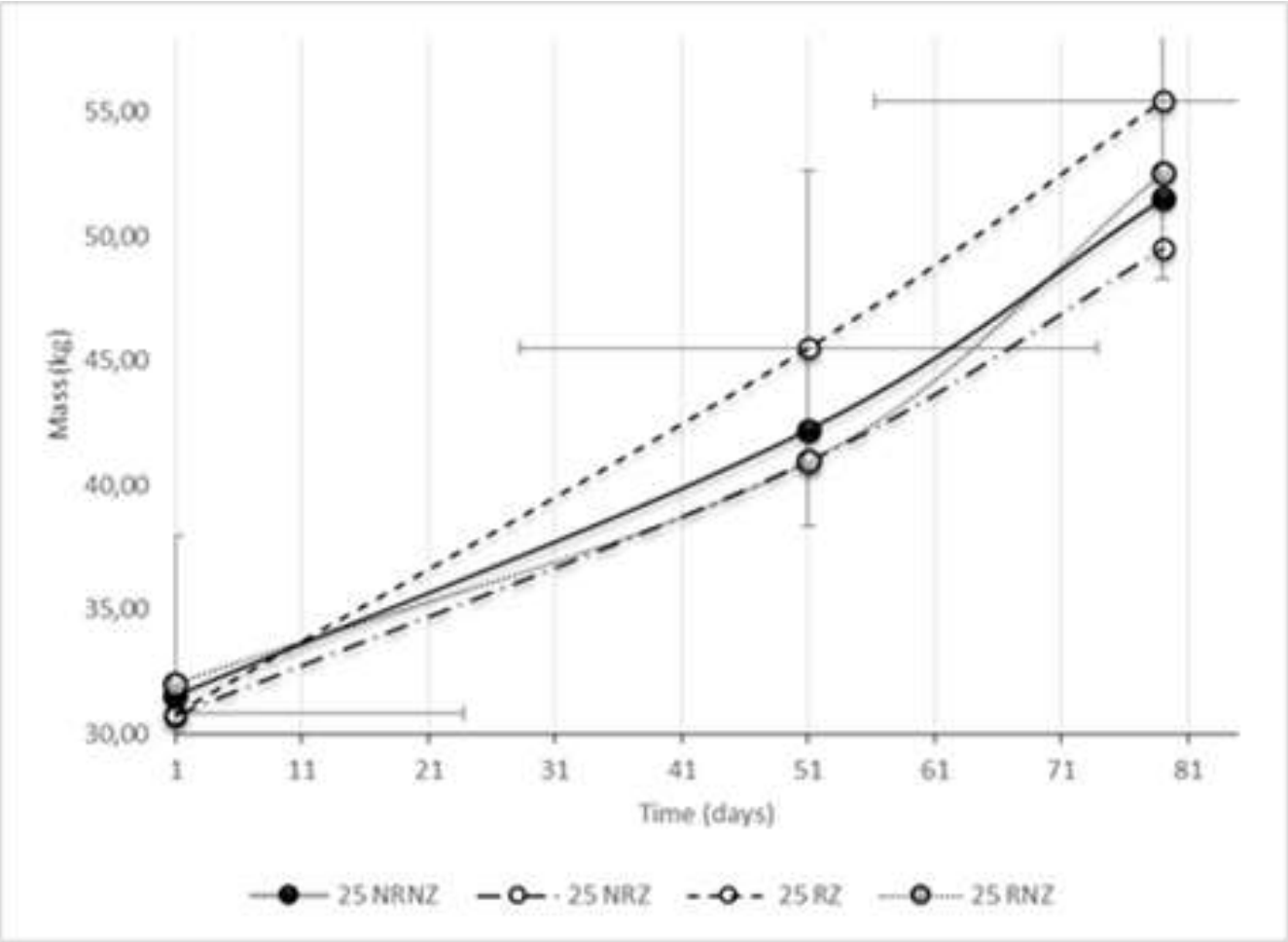


BETA-AGONISTS

- β -adrenergic agonists effects (β_1 , 2 or 3) most effective in ovine species ~ ideal species
- Repartitioning effects more pronounced
 - 1) Receptor specificity (β_1 -AR, β_2 -AR or β_3 -AR)
 - 2) Effective in low doses (ppm)
 - i. Decreased proteolysis
 - ii. Increased muscle protein synthesis
 - iii. Lipolysis (decreased lipogenesis)



B-AGONISTS IN SOUTH AFRICAN FEEDLOT LAMBS



Webb, Allen & Morris, 2018



SUMMARY OF AVERAGE GROWTH DATA (LS MEANS \pm SD) OBTAINED IN TRIAL

Treatment group	Primary variable			
	ADG (kg) Days 45–71	ADG (kg) Days 45 to 71	FCR Days 45–71	LM (kg) Day 71
Control	4.72 \pm 1.69	0.225 \pm 0.081	7.22	39.70 \pm 4.47
Zilmax	5.56 \pm 1.42	0.265 \pm 0.068	6.02	42.82 \pm 4.20

AG: Average Gain, ADG: Average Daily Gain, FCR: Feed Conversion Ratio, LM: Live Mass.

Webb & Le Riche, 2019



SUMMARY OF SLAUGHTER DATA (LS MEANS \pm SD) OBTAINED IN TRIAL

	Lamb Carcass Characteristics			
Treatment	WCM (kg)	DP (%)	CL (cm)	CC (kg/cm)
Control	18.9 \pm 2.19	47.6 \pm 2.56	61.6 \pm 3.89	0.31 \pm 0.027
Zilmax [®]	21.4 \pm 2.01	50.1 \pm 2.04	64.4 \pm 1.87	0.33 \pm 0.026

WCM: Warm Carcass Mass; DP: Dressing %; CL: Carcass Length; CC: Carcass Compactness

Webb & Le Riche, 2019



EFFECT OF ZILMAX[®] TREATMENT ON WARM CARCASS WEIGHT (LS MEANS ± SD)

	Ewe	Ram	Wether	Pooled (Treatment)
Control	17.44 ± 1.91 ^{A_a}	20.41 ± 2.07 ^{A_e}	18.74 ± 1.62 ^{A_{ae}}	18.86 ± 2.19 ^{A_v}
Zilmax[®]	20.33 ± 1.25 ^{B_a}	22.61 ± 1.90 ^{B_e}	21.28 ± 2.33 ^{B_{ae}}	21.41 ± 2.01 ^{A_x}
Δ-Zilmax[®] vs Control	16.57%	10.70%	13.55%	13.52%

^AColumn means and ^{a,b}row means with different superscript letters differ (P<0.05); Δ-Zilmax[®] vs Control group ~%Difference between Zilmax[®] and control treatment groups.

Webb & Le Riche, 2019



THE EFFECT OF ZILMAX® TREATMENT (LS MEANS AND STANDARD ERROR) IN DIFFERENT SEXES ON DRESSING PERCENTAGE.

Treatment	Ewe	Ram	Wether	Pooled (Treatment)
Control group	48% ^{A_a}	46% ^{A_b}	49% ^{A_c}	48% ^A
Zilmax group	51% ^{A_a}	49% ^{A_b}	51% ^{A_b}	50% ^B
Zilmax vs Control group	6.25%	6.52%	4.08%	4.17%

^{ABC}Column means with different superscript letters differ ($P < 0.05$); _{a,b,c} Row means with different subscript letters differ ($P < 0.05$).

Webb & Le Riche, 2019



EFFECTS OF STEROIDAL IMPLANTS X ZILMAX ON FEEDLOT PERFORMANCE OF SHEEP

Total gain / lamb/ treatment group on a lamb with a standard first live weight of 30kg

30 kg Lamb @ R32.00	Treatments							
	Control	Ralgro	Rev G	Rev H	Control + β agonist	Ralgro + β agonist	Rev G + β agonist	Rev H + β agonist
Buying Price	960.00	960.00	960.00	960.00	960.00	960.00	960.00	960.00
Standing Days	56.00	56.00	56.00	56.00	56.00	56.00	56.00	56.00
Cost of Treatment	22.58	29.98	45.89	27.56	29.99	37.39	53.30	34.97
FI/Day	1.39	1.38	1.36	1.35	1.41	1.38	1.36	1.33
Cost of Feed@ R 2.60/kg feed	202.38	200.93	198.02	196.56	205.30	200.93	198.02	193.65
ADG	0.211	0.199	0.222	0.227	0.234	0.223	0.234	0.231
Total Gain (over 56 days)	11.82	11.14	12.43	12.71	13.10	12.49	13.10	12.92
Final Live Weight	41.82	41.14	42.43	42.71	43.10	42.49	43.10	42.92
FCR	6.59	6.93	6.13	5.95	6.03	6.19	5.81	5.76
Dressing %	0.460	0.478	0.473	0.470	0.502	0.490	0.500	0.487
Carcass Weight	19.24	19.67	20.07	20.07	21.64	20.82	21.55	20.90
Wool Income	90.00	90.00	90.00	90.00	90.00	90.00	90.00	90.00
Meat Income @ R60.00/kg	1154.12	1180.01	1204.22	1204.48	1298.29	1249.15	1293.12	1254.12
Gain / Lamb	59.16	79.10	90.31	110.36	193.01	140.83	171.80	155.50

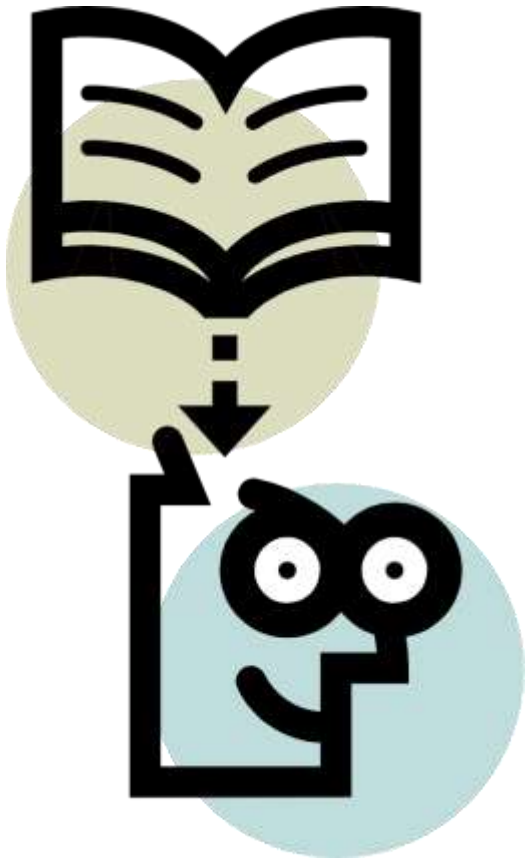


INFLUENCE OF STEROIDAL IMPLANTS X ZILMAX ON TISSUE RESIDUES IN SHEEP LIVER

Laboratory results of residue tests on composite liver samples of all treatment groups

No	Sample Ref	Trenbolone Acetate(ppb)	Zilpaterol Hydrochloride(ppb)	Zeranol (ppb)
	MRL	2.0ppb	0.5ppb	2.0 ppb
	Method nr.	LCQ 024	LCQ 025	HPLC 013
1	Control F	< 1.00	< 1.00	< 1.00
2	Control M	< 1.00	< 1.00	< 1.00
3	Control W	< 1.00	< 1.00	< 1.00
4	Ralgro F	< 1.00	< 1.00	< 1.00
5	Ralgro M	< 1.00	< 1.00	< 1.00
6	Ralgro W	< 1.00	< 1.00	< 1.00
7	Rev H F	< 1.00	< 1.00	< 1.00
8	Rev H M	< 1.00	< 1.00	< 1.00
9	Rev H W	< 1.00	< 1.00	< 1.00
10	Rev G F	< 1.00	< 1.00	< 1.00
11	Rev G M	< 1.00	< 1.00	< 1.00
12	Rev G W	< 1.00	< 1.00	< 1.00
13	Control+ Z F	< 1.00	< 1.00	< 1.00
14	Control+ Z M	< 1.00	< 1.00	< 1.00
15	Control+ Z W	< 1.00	< 1.00	< 1.00
16	Ralgro + Z F	< 1.00	< 1.00	< 1.00
17	Ralgro + Z M	< 1.00	< 1.00	< 1.00
18	Ralgro + Z W	< 1.00	< 1.00	< 1.00
19	Rev H +Z F	< 1.00	< 1.00	< 1.00
20	Rev H +Z M	< 1.00	< 1.00	< 1.00
21	Rev H +Z W	< 1.00	< 1.00	< 1.00
22	Rev G + Z F	< 1.00	< 1.00	< 1.00
23	Rev G + Z M	< 1.00	< 1.00	< 1.00
24	Rev G + Z W	< 1.00	< 1.00	< 1.00





THANK YOU!

