

Opportunities in Southern Africa using Animal Economic Values

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South Africa

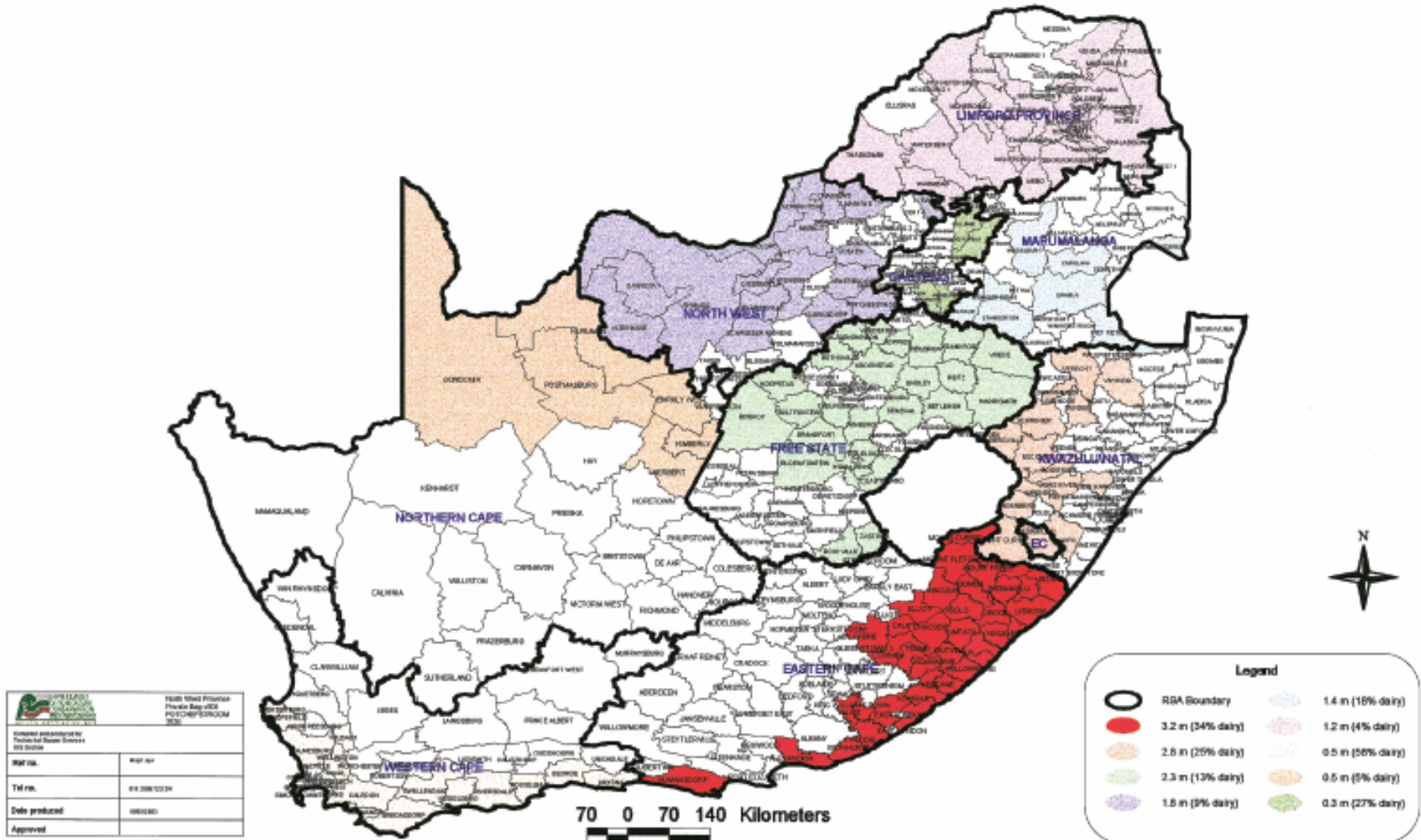


Livestock numbers, South Africa

	Cattle	Sheep	Pigs	Goats
Numbers	14mil	29mil	1.6mil	7mil
% Emerging sector	(40.8)	(12.1)	(26.5)	(69.5)



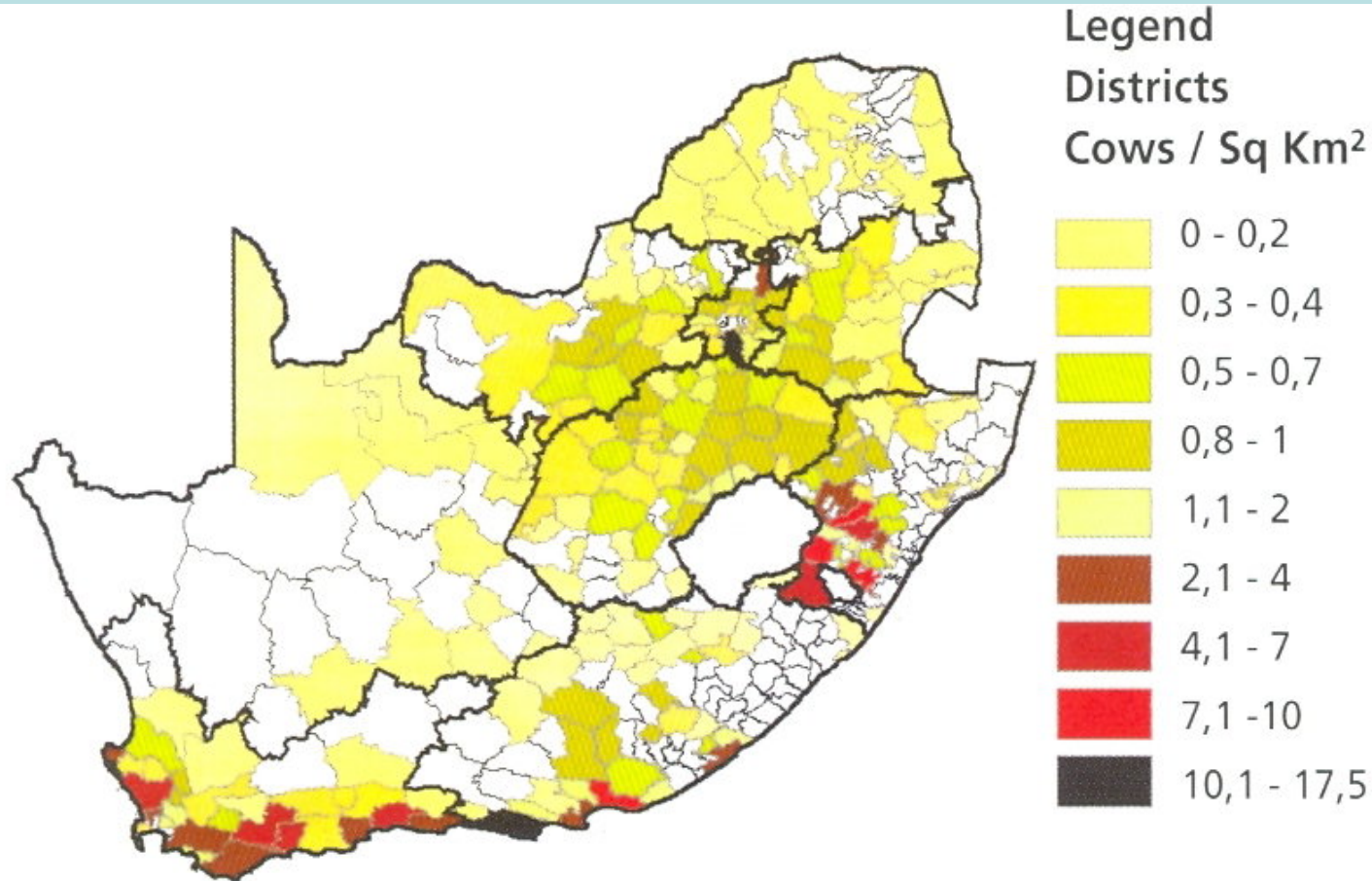
Cattle density in South Africa



	
1995-1996 Province Financial Report PROCHAP/STROOM 2000	
Prepared and approved by: Technical Support Services 2000	2000
Ref no. 2000/0001	2000/0001
Date produced 2000/0001	2000/0001
Approved 2000/0001	2000/0001

Map 1: Areas within each province where more than 80 % of cattle numbers are concentrated.

Dairy cow density per district (cows/km²)



Source: MPO statutory information

Two studies, two different approaches

- Bonsmara beef cattle, based on a simulation for profit drivers per hectare, rather per animal.
- Holstein and Jersey dairy cattle where a bio-economic herd model simulating an average farm, for each breed in each production system was developed.



Bonsmara (beef cattle)

- Identify all traits which has a direct economical impact on the enterprise and can be quantified.
- Simulation developed that included all relative economical traits identified to determine the change in profit with a one unit change in a relative economical trait



Qualifying relative economic important traits

- **Survival percentage of calves from birth to wean,**
- **Calving interval,**
- **Weaning weight (wean direct),**
- **Milk production (wean maternal),**
- **18 months weights,**
- **Mature weight and**
- **Average daily gain.**



Profit base

- Simulation program based on a yearly gross income per hectare - given certain available amount of energy (per hectare).
- Farm size and grazing capacity (large stock unit/hectare) also taken into consideration.
- Unit values for weaner (R14.50/kg) and slaughter (R18.50/kg) price/kg used.
- Due to nature of extensive beef farming, input costs were limited.

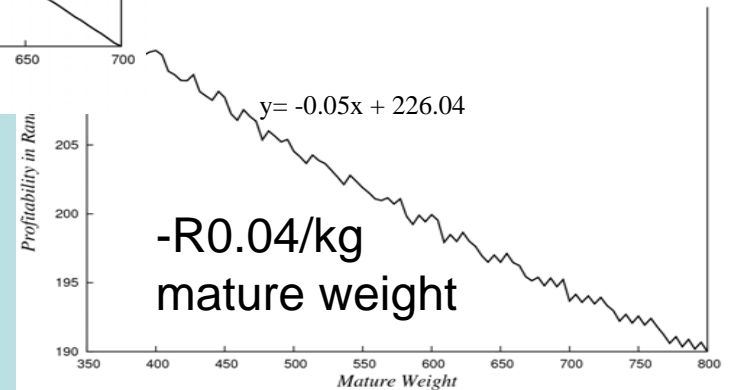
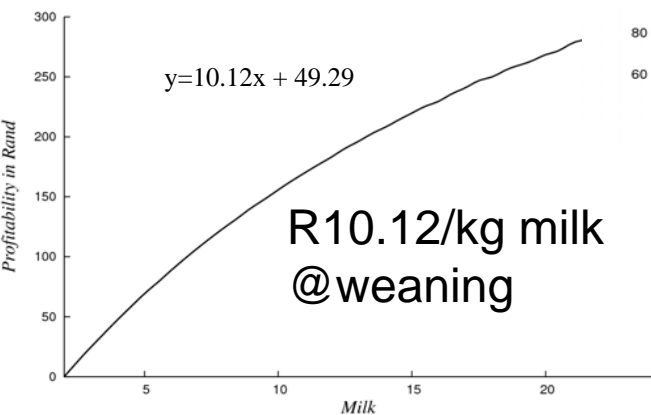
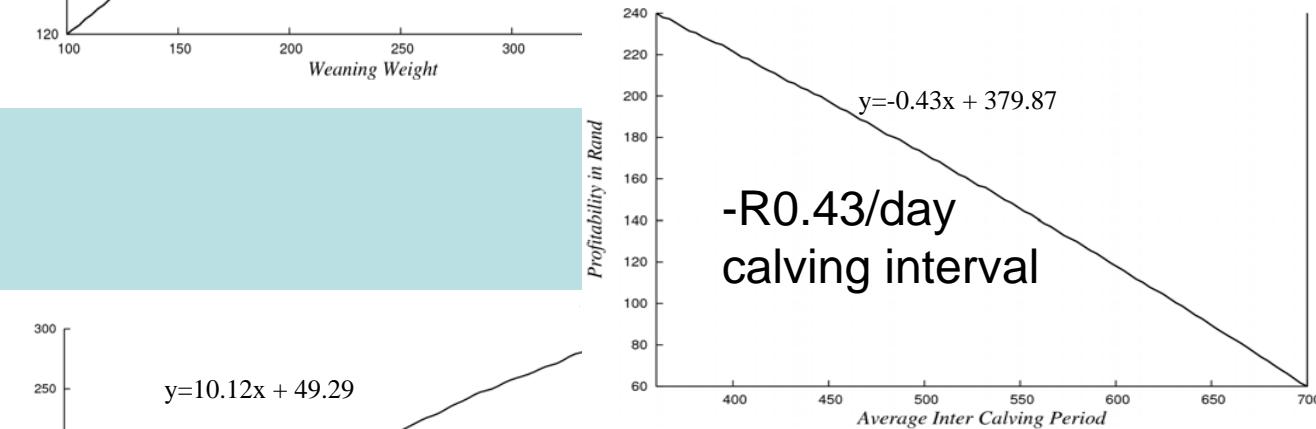
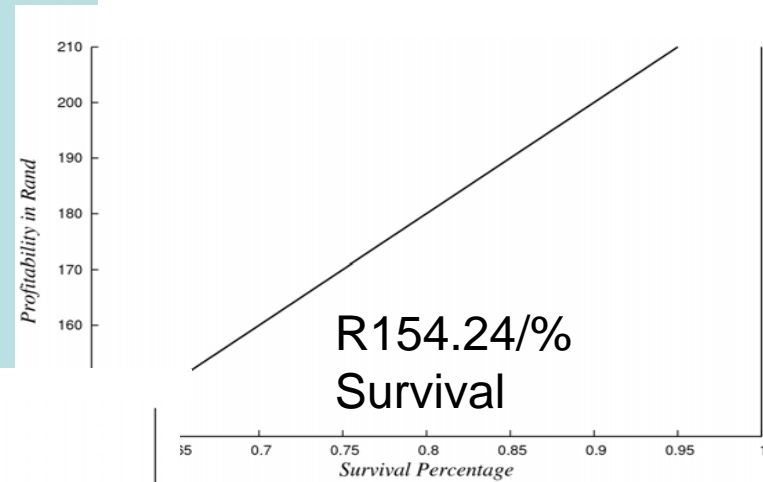
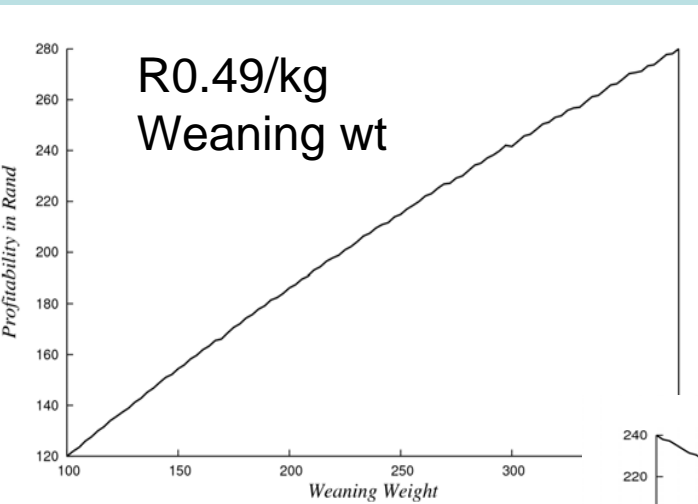


Herd profitability values

- **Simulated for every unit change within biological levels for:**
 - weaning survival percentage,
 - weaning weight,
 - milk production,
 - 18-months weight,
 - mature weight,
 - Post weaning average daily gain and
 - Calving interval



Some profitability changes



Use of indicator traits

- **Relative economical value for indicator traits**
- **Full genetic (co)-variance matrix for all measured traits having an effect on profitability**
- **Product of multiplication of the vector of the relative economical values of the RETs with the genetic (co)-variance matrix for all traits = vector of relative economical values for all traits.**



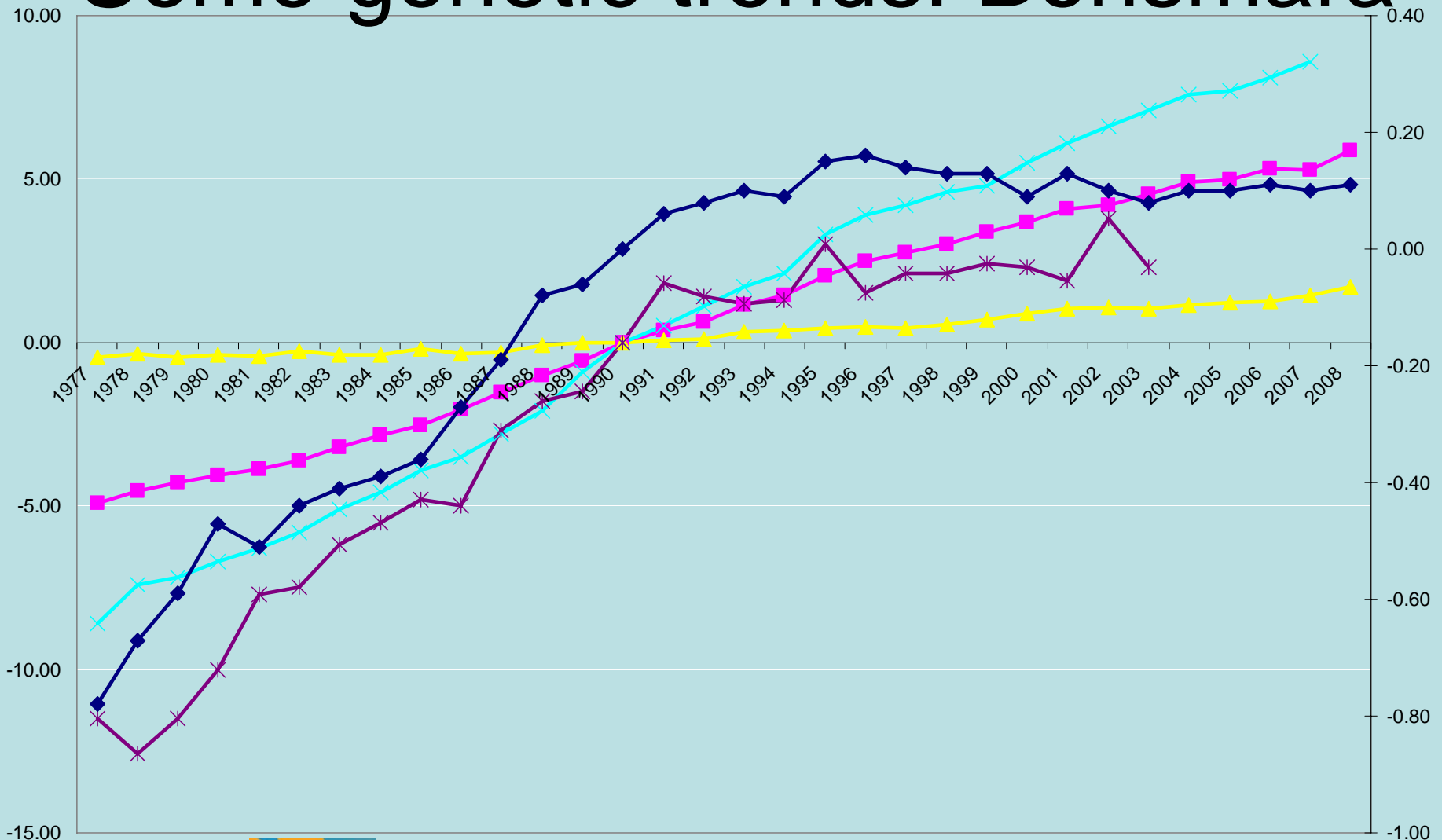
Beef Farm Profitability Index

- - (1.82*[Birth weight direct])
- + (3.31*[Weaning weight direct])
- + (0.43*[18 Months weight direct])
- - (0.43*[Mature weight direct])
- - (1.06*[Birth weight maternal])
- + (4.56*[Weaning weight maternal])
- - (0.03*[Age at first calving])
- - (4.26*[Calving interval])¹

¹ Defined as: $(Ci1*0.44)+(Ci2*0.33)+(Ci3*0.23)$



Some genetic trends: Bonsmara

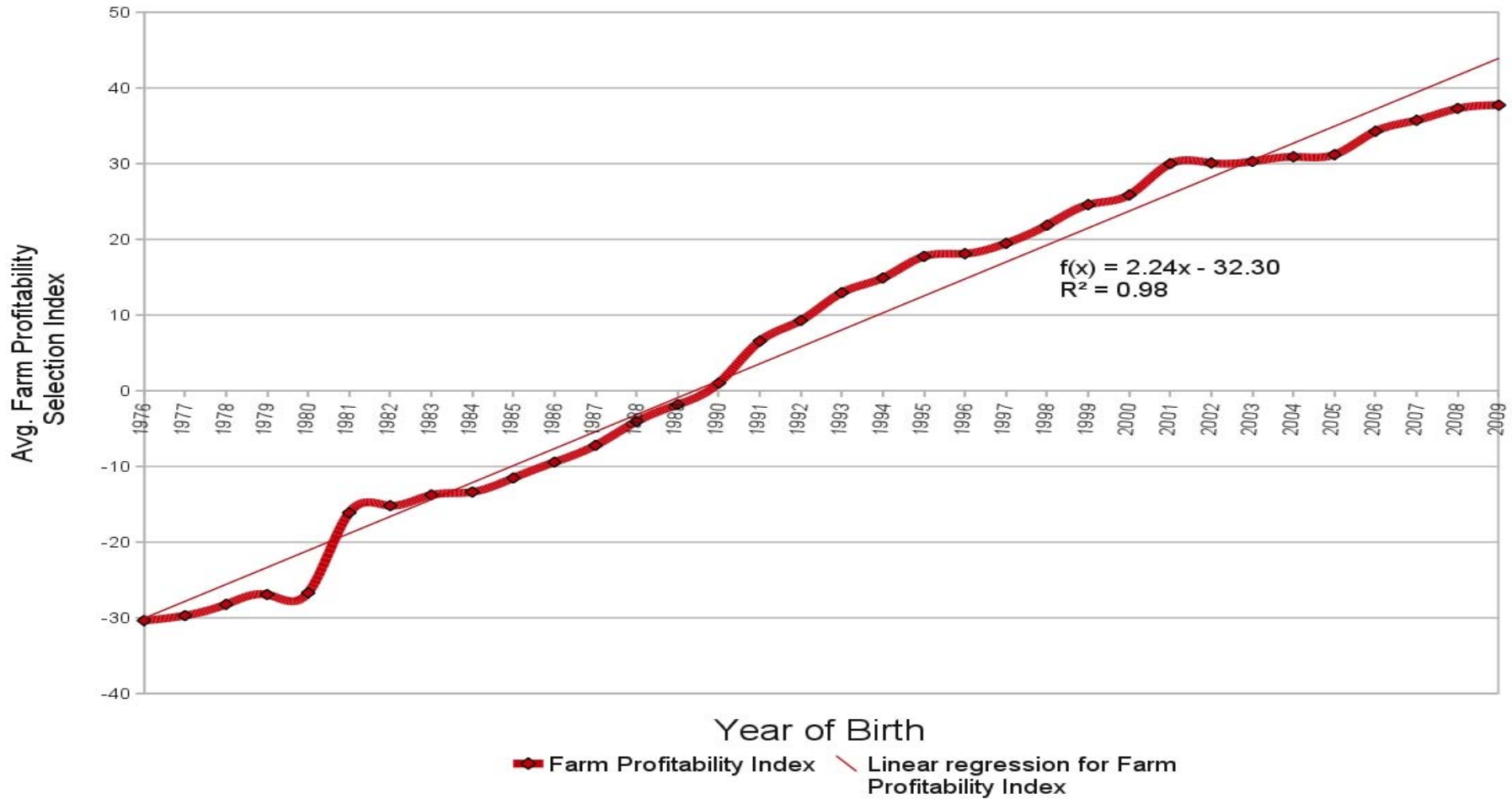


■ Wean Direct
 ▲ Wean MAternal
 ✕ 18 Months
 ✱ Mature Wt
 ◆ Birth Direct



Progress Farm Profitability

Genetic Trend Farm Profitability Selection Index



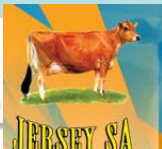
Dairy cattle

- **Partial budget approach to compute economic values – simulating marginal change in profit resulting from a unit increase in a trait, while all other traits remained constant.**
- **Profit expressed per cow in the herd per year.**



Assumptions

- Herd model simulated typical breeding and management practices in the two major production systems in South Africa (pasture and concentrate-based system).
- Pasture production system grazed on pasture and given 6 to 10 kg (as fed) of concentrate per cow per day during lactation.
- Concentrate production system fed total mixed ration (TMR), quantities based on production.
(Ave energy content of feed (MJ ME/kg DM) was 9.0, 9.5, 11.0 and 14.0 respectively for pasture, silage, TMR and concentrate.)



Other parameters

- **Base herd parameters (production, productivity and reproduction traits)**
- **Live weight prediction (each month of age)**
- **Feed requirements**
- **Energy requirements (Maintenance, production, replacements, cow growth, pregnancy)**
- **Milk payment systems (milk components, SCC)**
- **Beef price**
- **Farm costs**



Calculation of economic values

- Economic values calculated by first considering incomes and expenses for alternative herds, each herd differing from the base herd in only one trait.
- Incomes and expenses were expressed per cow in the herd per year.
- Six alternative herds differing from the base herd by 10 kg fat, 10 kg protein, 500 kg milk, 50 kg live weight, 30 days calving interval and 10 days productive life time, respectively, were considered.



Results: concentrate fed herds

Breed	Trait	Payment System			
		A	B	C	D
Jersey & Holstein	Fat (kg)	1.21	5.81	2.47	4.21
	Protein (kg)	7.62	21.88	19.88	20.21
	Milk (kg)	0.28	-0.49	-0.49	0.28
Jersey	Longevity (days)	1.15	1.11	1.09	1.23
	Live weight (kg)	-7.49	-7.49	-7.49	-7.49
	CI (days)	-4.19	-4.19	-4.19	-4.19
	SCC	-433.87	-912.90		
Holstein	Longevity (days)	3.68	3.59	3.59	3.67
	Live weight (kg)	-6.62	-6.62	-6.62	-6.62
	CI (days)	-5.75	-5.75	-5.75	-5.75
	SCC	-949.26	-1795.57		



Results: Pasture based herds

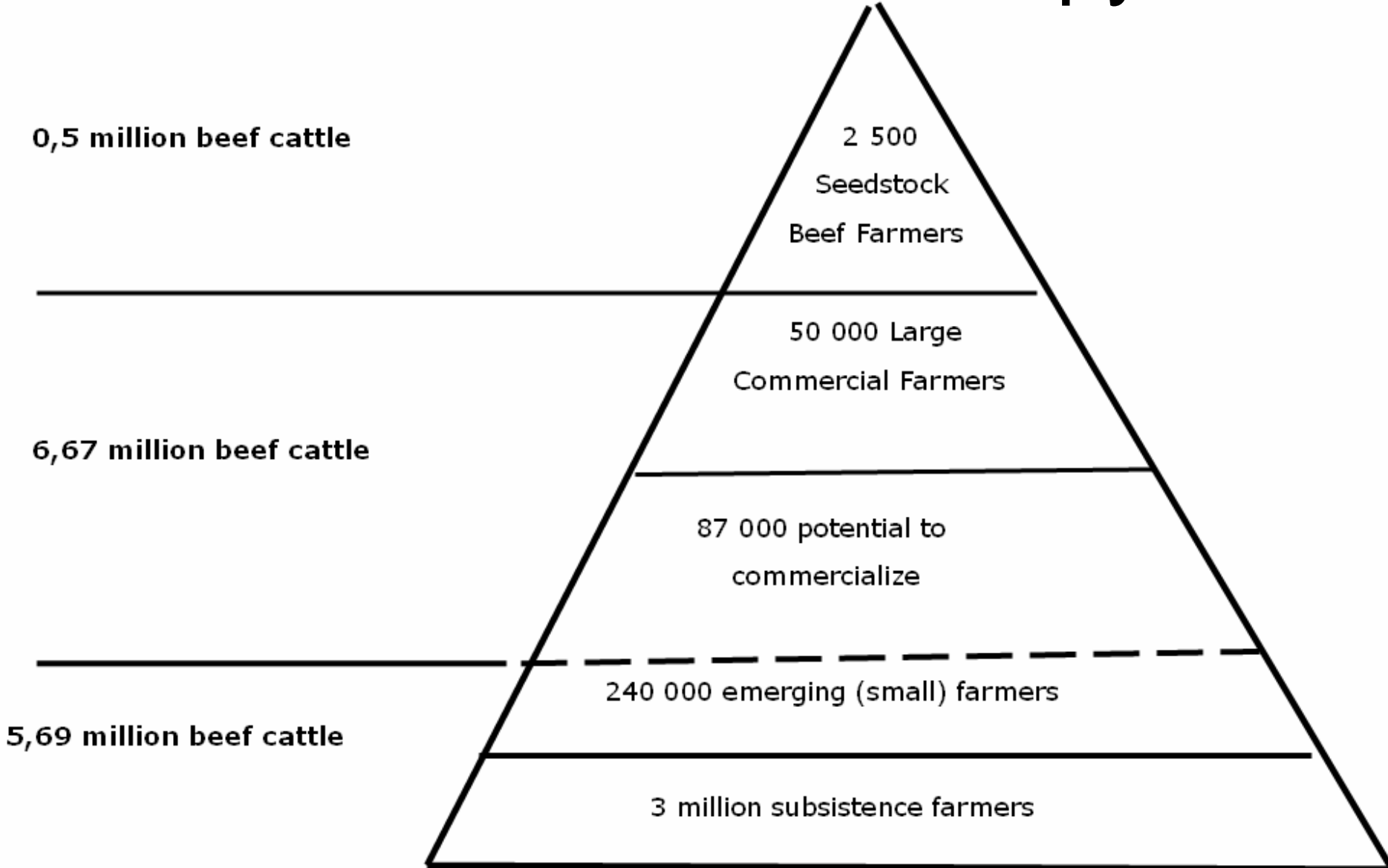
Breed	Trait	Payment System			
		A	B	C	D
Jersey	Fat (kg)	6.26	10.91	8.59	6.51
	Protein (kg)	10.48	24.77	23.35	21.42
	Milk (kg)	0.45	-0.32	-0.28	0.36
	Longevity (days)	1.77	1.73	1.54	2.29
	Live weight (kg)	-4.63	-4.60	-3.93	-6.46
	CI (days)	-2.47	-2.45	-2.19	-3.18
	SCC	-178.65	-367.37		
Holstein	Fat (kg)	6.36	11.52	9.10	6.76
	Protein (kg)	10.54	25.11	23.63	21.56
	Milk (kg)	0.45	-0.30	-0.27	0.37
	Longevity (days)	3.68	3.59	3.59	3.67
	Live weight (kg)	-4.12	-3.78	-3.22	-5.71
	CI (days)	-3.19	-3.00	-2.68	-4.05
	SCC	-491.48	-938.00		



Possibilities



South African Beef cattle pyramid



Beef Cattle Possibilities

- Possible to impact a large number of cattle
- Positive genetic change based on cow profitability are possible.
- Trend in prominent beef breed (Bonsmara) can be achieved in multiplier and other herds.
- Sharing some common environments and production systems in Southern Hemisphere



Dairy Cattle

- 25 % Dairy cows in Milk Recording
 - \pm 1/3 Jersey Seedstock
 - \pm 1/3 Holstein Seedstock
 - \pm 1/3 Non Seedstock (Mainly Holstein)
- Main dependence on imports of semen (more than 50% of calves born)
- ERT (with MACE) allows opportunity to better guidance in local bull rankings



Thank You

