

Economic Heterosis & Breed Complementarity for Dairy Cattle



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Introduction

- Crossbreeding favourably changes
 - Milk production: volume, fat and protein
 - Reproduction: conception rate
 - Health
 - Survival
- The combined effects of these traits results in notable economic heterosis
- Economic heterosis can also arise from breed complementarity (Moav, 1973)



Objective

Quantify the economic effects of

- heterosis for individual traits, and
- breed complementarity

on farm profit in a pastoral dairy system



Methods

A pastoral farm model was used to simulate profit for scenarios defined by alternative

- Mating strategies

- Straightbreeding vs Crossbreeding

- Payment systems

- Single vs Multiple Components

- Milk Yield vs A (kg Fat) + B (kg Protein) – C (L milk)

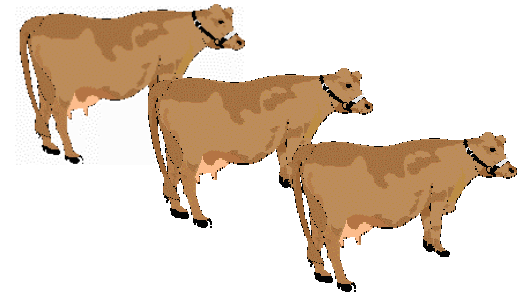
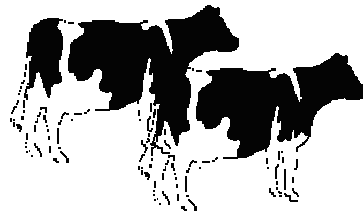
- Values for milk

- Commodity (low price) vs Fluid (premium price)

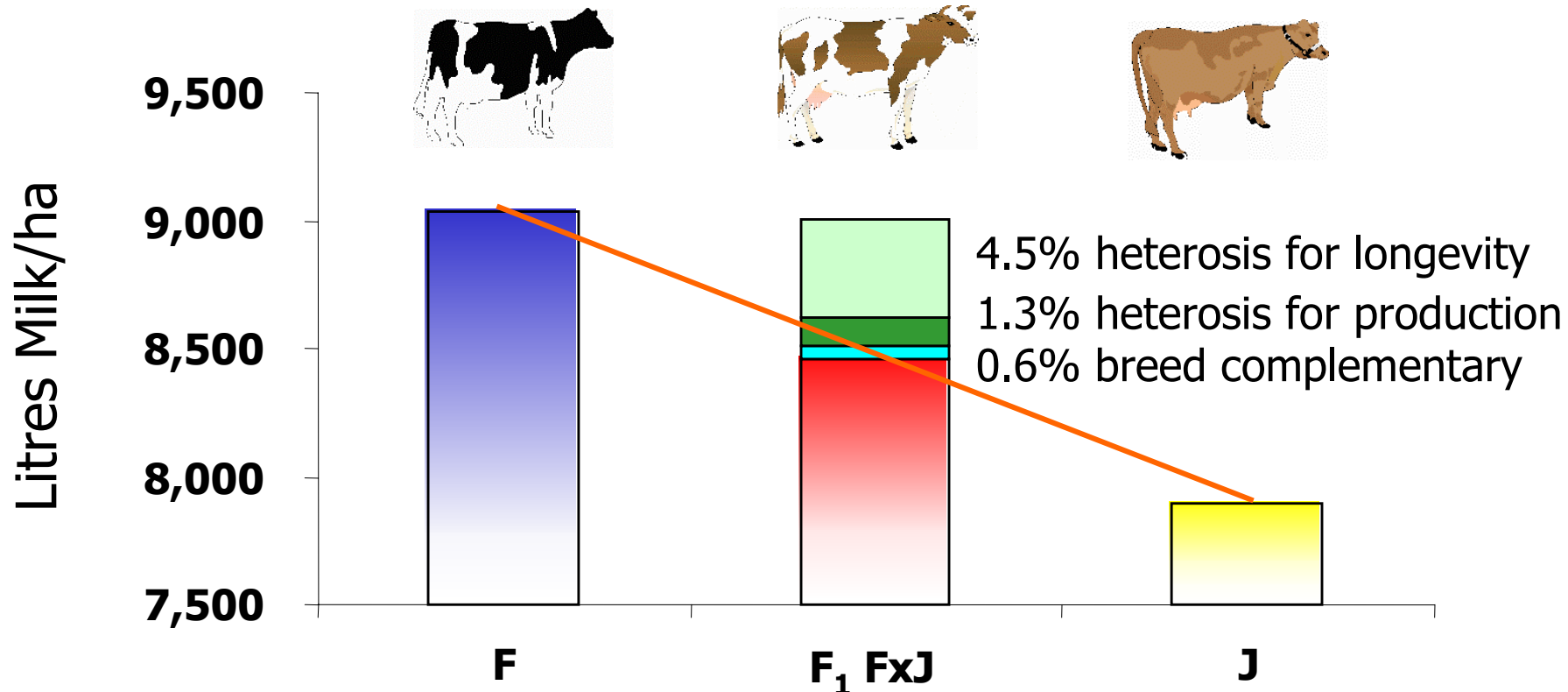
- NZ\$0.29/litre vs NZ\$0.37/litre (US\$1 = NZ\$ 2.2)

Per cow vs per ha production

	Friesian	Jersey
Milk yield, L/cow	3,770	2,768
Feed Req, t/cow	5.0	4.2
Feed supply, t/ha	12	12
Stocking rate	$12 \div 5.0 = 2.4$	$12 \div 4.2 = 2.9$
Milk yield, L/ha	9,036	7,890



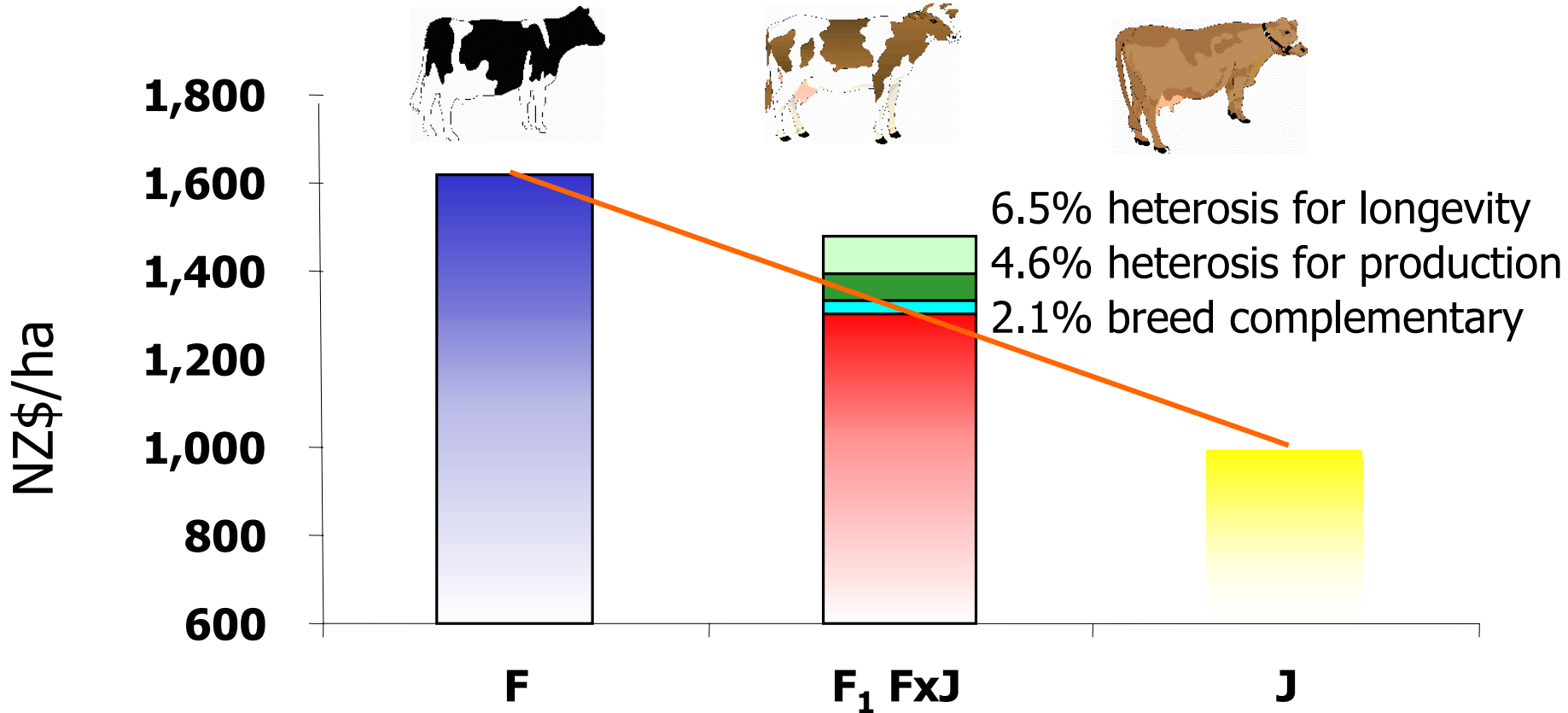
Productive performance



	F	F₁ FxJ	J
Milk yield/cow	3,770 L	3,269 L	2,768 L
Stocking rate	2.4	2.6	2.9

Farm Profit

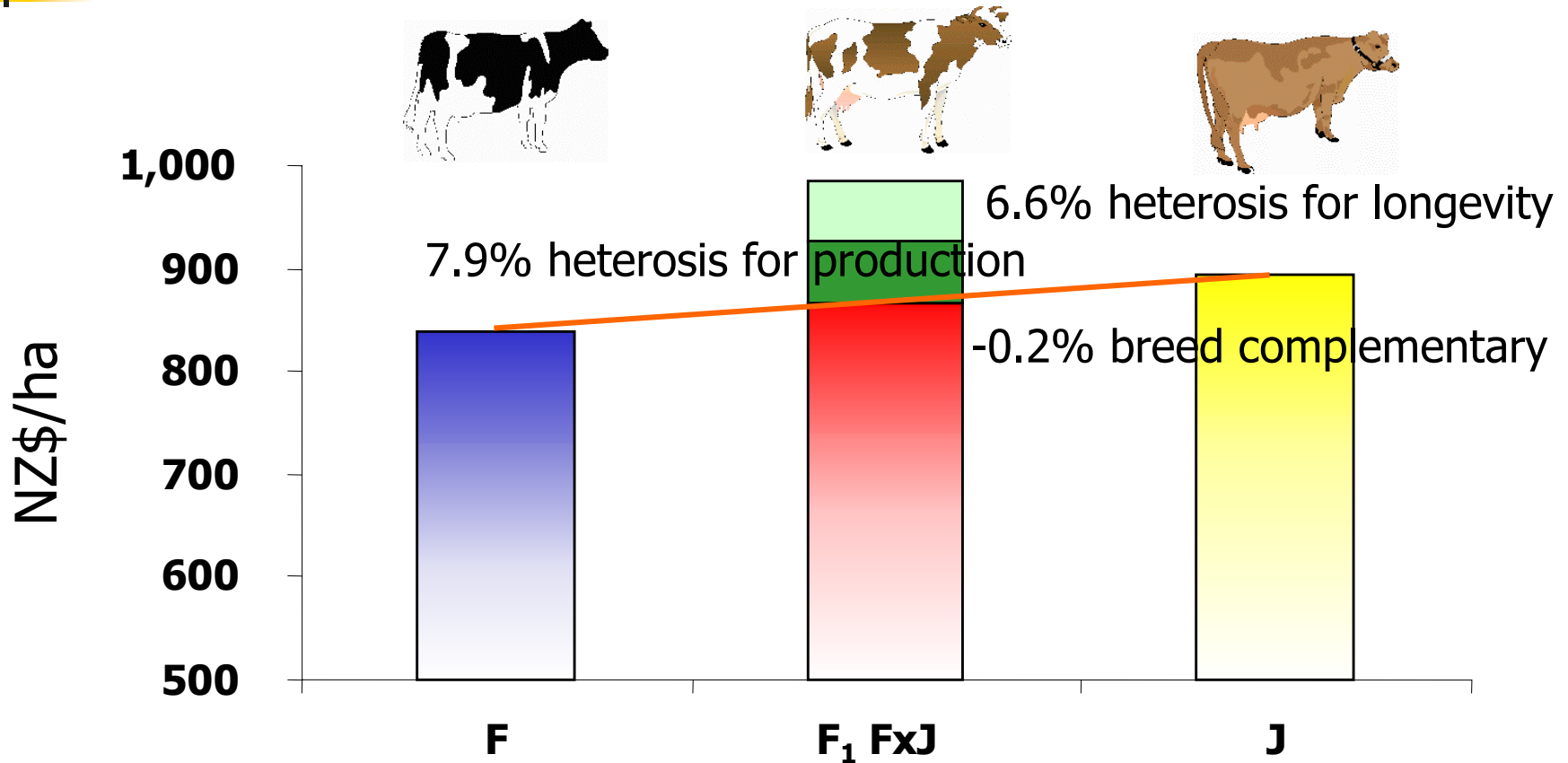
Premium price per litre



Profit per cow	\$674	\$511	\$348
Stocking rate	2.4	2.6	2.9

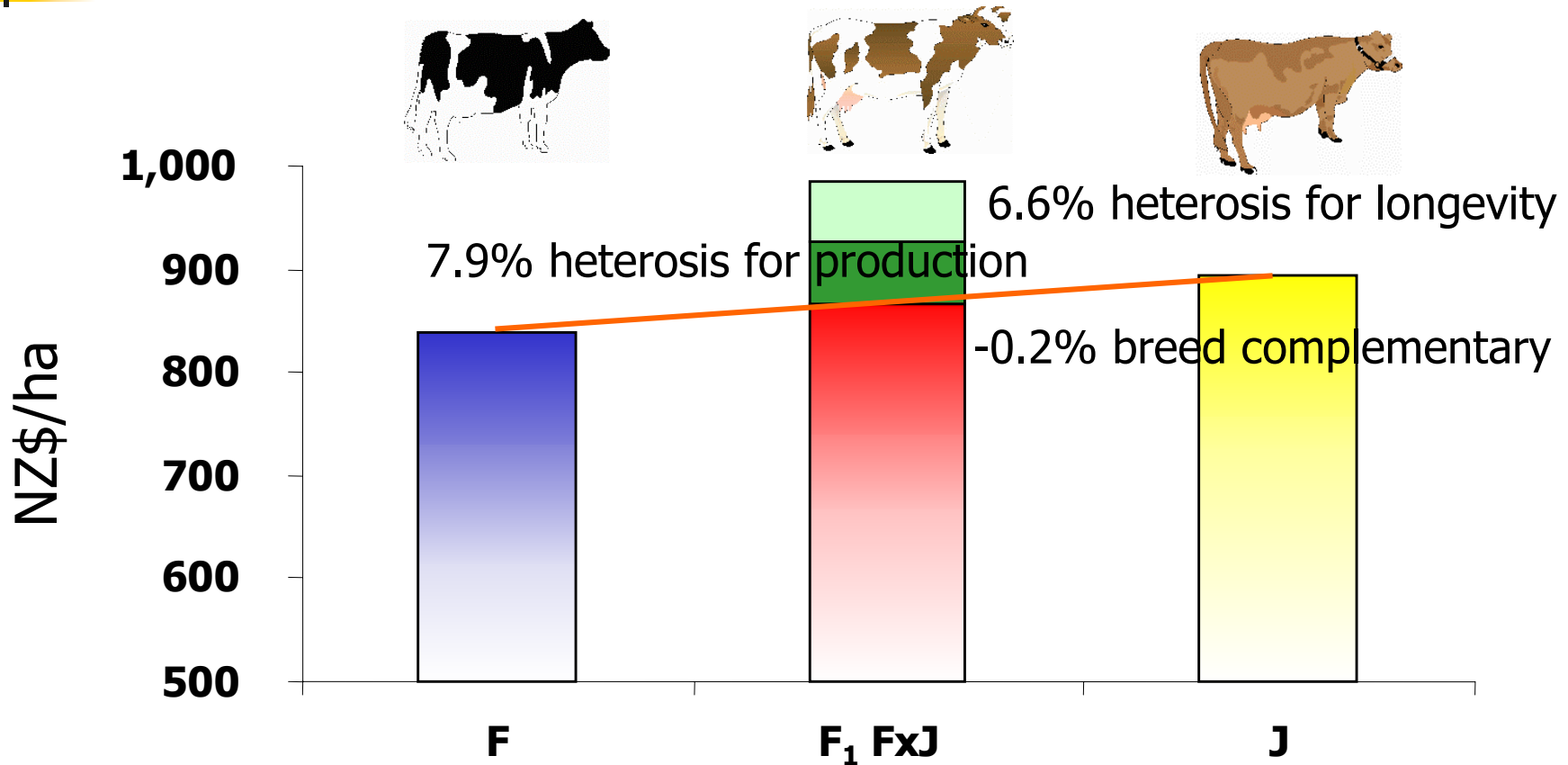
Farm Profit

Multiple component low commodity price



Farm Profit

Multiple component low commodity price



Creating a Genotype x Environment Interaction
for economic performance even
without G x E for individual traits

Conclusions

- Merit of breeds (& their crosses) depends on management & economic circumstances
 - Stocking (or substitution) rates
 - Payment systems for milk
- Accumulated effects of both individual trait heterosis and breed complementarity contribute to economic heterosis

