ANNEXURE I

RESULTS FOR THE TRAITS MEASURED CENTRALLY DURING THE YEAR 2000 FOR THE DIFFERENT BREEDS AND SEXES

BREEDS & SEXES	No	AGE (Days)	FCR (Unit)	Back fat (mm)	ADG (g/day)	DFL (%)
S.A. Landrace male	69	128	2.06	14.0	1 058	54.56
S.A. Landrace female	65	132	2.29	15.1	967	54.12
Large White male	266	132	2.03	13.2	1 068	54.41
Large White female	216	135	2.23	13.6	979	54.42
Duroc male	102	**132**	**2.21**	**14.6**	**1 044**	**53.52**
Duroc female	97	**139**	**2.49**	**15.6**	**939**	**53.05**

* Source: Animal Improvement Institute (AII, 2001).

ANNEXURE II

CONSUMER PERCEPTIONS OF THE VARIOUS TYPES OF MEAT

REMARKS	SA BEEF		SA LAMB		SA MUTTON		NEW FASHION PORK		CHICKEN		FISH	
	APRIL	OCT	APRIL	OCT	APRIL	OCT	APRIL	OCT	APRIL	OCT	APRIL	OCT
	%	%	%	%	%	%	%	%	%	%	%	%
Is nutritious	51	52	30	31	33	30	12	13	60	54	46	42
Is expensive	34	34	46	49	48	46	10	11	9	10	9	8
Is good value for money	27	22	10	10	13	10	8	9	62	62	32	33
The one that your family likes	33	31	12	14	15	13	3	4	55	57	11	13
Is tender	17	21	28	27	19	16	5	6	48	51	24	25
Is fatty	22	22	16	16	29	30	33	32	9	8	3	3
Easy to prepare	22	26	14	16	14	16	7	10	65	68	39	39
For the whole family	44	42	22	23	25	25	9	11	71	72	27	28
Is for socialising/entertaining	30	37	26	25	30	27	6	7	41	47	12	14
Can be prepared in many ways	47	45	26	25	31	28	11	10	72	72	28	27
What you like best	31	31	15	13	17	14	5	5	53	57	15	15
What you order at the restaurant	26	26	7	9	9	9	3	3	40	42	25	26
Is not fattening	10	8	5	4	5	3	4	5	43	47	54	51
Is relatively inexpensive	12	10	4	3	5	3	6	6	50	50	32	33
Is popular	40	45	17	19	20	22	5	7	64	64	22	23
Is the tastiest	34	36	25	23	29	24	7	6	52	54	18	19
Is healthy	29	27	15	13	19	15	8	7	64	65	57	56
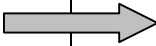
* Source: MRA MULTIBUS 1997 (MRA, 1997)

REMARKS	SA BEEF		SA LAMB		SA MUTTON		NEW FASHION PORK		CHICKEN		FISH	
	APRIL	OCT	APRIL	OCT	APRIL	OCT	APRIL	OCT	APRIL	OCT	APRIL	OCT
	%	%	%	%	%	%	%	%	%	%	%	%
Takes a long time to cook	53	51	8	9	19	18	6	6	5	5	2	2
Contains iron	42	47	17	18	22	19	7	7	23	26	28	25
Causes health problems	27	31	10	11	14	15	14	12	3	2	2	2
Is ideal for braaing	53	63	41	41	43	40	9	10	24	32	8	10
Smells bad	2	2	2	3	3	4	14	14	2	3	22	27
A luxury	20	23	28	32	25	25	6	7	18	20	8	10
Preferred by children	10	9	7	7	6	6	2	3	60	56	17	16
Preferred by adult men	64	67	23	23	31	27	6	7	22	19	7	8
Not eaten by everyone in the household	8	9	6	7	6	8	34	32	7	8	13	10
Is low in cholesterol	6	5	3	2	4	2	5	7	34	36	38	40
Is white meat	1	1	1	1	1	1	11	13	83	82	53	53
Is local meat	59	59	41	42	42	42	16	17	51	48	23	23
Preferred by teenagers	17	17	9	10	11	12	3	4	54	51	15	15
The food for today/modern	22	29	12	14	17	17	9	9	53	56	17	20
Is full of protein	43	44	22	23	27	24	12	13	52	52	45	43
Has a low fat content	9	6	3	3	4	2	4	6	42	44	48	48
Is frozen	14	14	10	9	11	12	8	9	63	62	47	46
Is imported meat	19	13	8	7	10	7	5	5	12	13	6	7

* Source: MRA MULTIBUS 1997

<div align="right">**ANNEXURE III**</div>

THE SHIFT IN AGRICULTURE

THE 1990's ➡	**BEYOND 2000**
1. The Producer	1. The Consumer
2. Production and Quantity	2. Consumption and Quality
3. Forward production	3. Backwards traceable
4. Mass production and good standards	4. Niche production with guarantees of quality assurance, certification and labelling
5. Highly acceptable product	5. A safe, hygienic and wholesome product
6. A product's attributes	6. A product's consequences
7. Technology	7. Biotechnology
8. Informed customers	8. Hyper critical customers
9. The animal	9. The molecule
10. Macroscopic	10. Microscopic
11. Genetic research	11. Genomic research
12. Blood typing	12. Microsatellite characterization
13. Morphological and serological diagnostic methods	13. Nucleic acid probes coupled with polymere chain reaction (PCR)
14. Research and Technology Transfer	14. Patenting, Intellectual Property & Confidentiality
15. Physical property	15. Intellectual property
16. Money and assets as the primary locus of control	16. Information and business intelligence as the primary locus of control
17. Predictable norms	17. Highly accurate standards
18. Continental competition	18. Global competition
19. Just-in-time (JIT)	19. Instantly (Tray ready)
20. Industries	20. Supply chains/Value adding partnerships
21. Big Family Businesses	21. Vertically alligned supply chains
22. Hierarchical governance	22. Network based governance
23. Government subsidiation	23. No or less government subsidiation
24. Theory, Knowledge & Experience	24. **Internet** driven, literate and informed

<div align="right">**ANNEXURE IV**</div>

EXPLANATION OF THE PORCUS CLASSIFICATION SYSTEM

Pork carcasses are classified as "Weaners", Class P, Class O, Class R, Class C, Class U, Class S, Sausage or Rough in South Africa. Classification of a carcass can be conducted on one half of the carcass or the full carcass.

(i)   **Weaner** - A carcass weighing 20 kg or less

(ii)   A carcass weighing more than 21 kg, but no more than 90 kg, is classified according to the percentage (%) lean meat in the carcass [Vide Table below]. Two categories are applicable within this weight range
    • Porkers 21 - 55 kg carcass mass
    • Baconers 56 - 90 kg carcass mass

(iii)   **Sausage** - A carcass weighing more than 90 kg.

(iv)   **Rough** - A carcass is classified as rough when:

- it is descendent from (old) boars
- it has a carcass conformation score of 1
- it shows obvious genetic inferiority
- it is excessively thin
- the skin appears thick and coarse
- the fat in the carcass is excessively oily

Classes for pork carcasses	Estimated % lean in the carcass
Weaner	**
P	70 and more
O	At least 68, but no more than 69
R	At least 66, but no more than 67
C	At least 64, but no more than 65
U	At least 62, but no more than 63
S	61 and less
Sausage	**
Rough	**

** The lean meat content for these classes is not specified.

Estimating the % lean in the carcass:

(i)   The % lean meat in the carcass is estimated by:

- measuring the fat thickness and eye muscle thickness with an electronic thickness meter (Hennesy Grading Probe) or
- measuring the fat thickness with an Intrascope

Both measurements are taken between the 2nd and 3rd last ribs, 45 mm from the mid-back line whilst the carcass is hanging.

(ii)   The percentage lean meat depending on which apparatus is being used, is calculated by means of the following formulae:

- Hennesy % Lean = 72.5114 - (0.4618 x fat thickness) + (0.057 x eye muscle thickness)
- Intrascope % Lean = 74.4367 - (0.4023 x fat thickness)

(iii)   Both fat thickness and eye muscle thickness are measured in mm. The result of calculation is rounded off to the nearest 1 %, before a carcass is classified.

ANNEXURE V

THE EXTENT AND SCOPE OF QUALITY ASSURANCE SCHEMES

A. PRODUCT QUALITY

- Absence of PSE

- No excessive fat, yet well marbled

- Organoleptic attributes (taste, tenderness, juiciness, flavour)

- Colour

- Absence of boar taint

B. TYPE OF ANIMAL

- Size and age

- Breed

- Castrated or not

- Biotechnologically sound

C. PRODUCT SAFETY (Health aspects)

- Salmonella

- Campylobacter

- Trichinella

- Drug residues

- Hormonal residues

- Heavy metals

- Anti microbes

D. ENVIRONMENTAL SUSTAINABILITY

- Odour(s)

- Surface water protection

- Ground water protection

- Clean Air and Clean water

E. ETHICAL (Consumer Aspects)

- Impact and use of Biotechnology
- Free range / out of doors
- No hormones
- No antibiotics
- Organic *vs* conventional production
- Environmental issues (Pollution)
- Worker Safety
- Country of origin
- Religous requirements
- No GMO's in feed
- No stalls and tethers
- Humane killing methods
- Disease free end products
- No meat and bone meal in food
- Proper carcass disposal
- Backwards Traceability

Source: International Pig Topics, 2000 (IPT, 2000).

THE RELATIVE IMPORTANCE OF DIFFERENT REPRODUCTION AND PRODUCTION TRAITS IN THREE DIFFERENT COUNTRIES

	Relative importance *		
	USA	**France**	**The Netherlands**
REPRODUCTION TRAITS (Dam line)			
Age at puberty	6	6	3
Conception rate	28	14	36
Number born alive/litter	35	48	34
Piglet survival	31	32	27
TOTAL	100	100	100
PRODUCTION TRAITS (Sire line)			
Growth rate	28	15	38
Food Conversion	-	23	20
Dressing percentage	-	16	12
Percentage lean meat in carcass	72	46	30
TOTAL	100	100	100

* Relative importance is expressed as the percentage increase in profitability that can be expected from an increase of one phenotypic standard deviation of each trait.

Source: Ollivier (1999).

MEAT QUALITY TRAITS TO BE INCLUDED IN FUTURE BREEDING OBJECTIVES FOR THE SOUTH AFRICAN PIG STUD INDUSTRY

Trait	Heritability (h^2)	Optimum Range	Measuring Instruments	Remarks
pH_u*	0.30	5.75 - 5.85	PH-meter	
Water holding capacity*/(drip loss)	0.29	(0.5 - 1.5 %)	Loin chop in Netlon bag in plastic bag @ 0 - 5 °C for 48 hours	Should be treated as a linear trait Must diminish
Meat colour*	0.30	Probably 2.0 - 4.0	Minolta Chromameter EEL (Evans Electroselenium Limited) reflectometer	Further research for the South African pig carcasses is required
Intramuscular Fat	0.61	1.5 - 2.5 %	Soxtec instrument	Fat extraction with diethylether without HCL disintegration
Tenderness	0.30	Uncertain	Warner Bratzler	Best evaluated by taste panels Influenced by many factors

* These three traits are combined into a MQI (meat quality index) in France (Tribout & Bidanell, 1999).

MQI = [-41 + 11.01 PHSM + 0.105 WHC - 0.231 L], where:

PHSM = Semimembranosus muscle's ultimate pH

WHC = Water Holding Capacity

L = Reflectance of the Gluteus Superficialis muscle using a reflectometer (Minolta Chromameter CR300)

Andersen & Pedersen (1999) indicated that moderate heritability estimates for meat colour were found for the Landrace, Yorkshire and Duroc breeds (involving 4902 boars) in Denmark. According to the authors, selection for meat colour is possible and selection for production traits will not impact negatively on colour traits. Webb (1998) indicated that meat colour can be improved by as much as 40 % over ten years in a purebred line of pigs.

ANNEXURE VIII

A REVIEW OF HERITABILITIES AND GENETIC CORRELATIONS FOR PIGS WITH *AD LIBITUM* OR SEMI- *AD LIBITUM*** ACCESS TO FEED

TRAIT	RANGE	AVERAGE	Number of References	(Semi- *ad lib*** References)
Heritabilities				
ADG (a)	0.03 - 0.49	0.31	14	(3)
BF (b)	0.12 - 0.74	0.49	13	(3)
DFI (c)	0.13 - 0.62	0.29	11	(3)
FCR (d)	0.12 - 0.58	0.30	10	(3)
LTGR (e)	0.25 - 0.39	0.34	3	-
LTFC (f)	0.25 - 0.35	0.31	3	-
Genetic correlations				
ADG / DFI	0.32 - 0.89	0.65	9	(3)
BF / DFI	0.08 - 0.59	0.37	6	(3)
ADG / FCR	-1.24 - 0.34	-0.53	9	(3)
BF / FCR	0.10 - 0.44	0.30	7	(3)
ADG / BF	-0.26 - 0.55	0.12	9	(3)
ADG / LTGR	-	0.96	1	-
ADG / LTFC	-	-0.09	1	-
BF / LTGR	-	0.02	1	-
BF / LTFC	-	0.52	1	-
DFI / LTGR	0.23 - 0.31	0.27	2	-
DFI / LTFC	-0.45 to -0.36	-0.41	2	-
LTGR / LTFC	0.76 - 0.87	0.82	2	-

a = average daily gain; b = backfat; c = daily feed intake; d = feed conversion ratio; e = lean tissue growth rate;

f = lean tissue feed conversion

Source: Clutter & Brascamp (1998).

<div align="right">**ANNEXURE IX**</div>

A REVIEW OF HERITABILITIES AND GENETIC CORRELATIONS FOR PIGS WITH RESTRICTED FEED INTAKE

TRAIT	RANGE	AVERAGE	Number of References
Heritabilities			
ADG (a)	0.14 - 0.76	0.30	8
BF (b)	0.12 - 0.60	0.31	8
DFI (c)	-	0.20	1
FCR (d)	0.16 - 0.56	0.29	4
LTGR (e)	0.34 - 0.28	0.31	1
Genetic correlations			
ADG / DFI	-	0.28	1
BF / DFI	-	0.29	1
ADG / FCR	-1.07 to -0.93	-1.0	3
BF / FCR	0.16 - 0.30	0.23	2
ADG / BF	-0.39 - 0.08	-0.16	5

a = average daily gain; b = backfat; c = daily feed intake

d = feed conversion ratio; e = lean tissue growth rate

Source: Clutter & Brascamp (1998).

THE EXPECTED TRANSACTIONAL CHARACTERISTICS OF PORK PRODUCERS IN SOUTH AFRICA

Governance Structure	Quality Specific Investments	Grading System	Prices Received	Observed Quality	Ex-post Bargaining Power
Spot Market (Township slaughtering)	No	No	Moderate to above average	Low	Very limited
Spot Market (Classical contract)	Yes	Yes	Moderate to uncertain	Fluctuating	Uncertain?
Neo Classical Contract (Formal written contract)	Yes	Yes	High	High	Low?
Relational Contract (Oral agreements)	Yes	Yes	High	High	Moderate?

Source: Adapted from Beckmann & Boger (2000).

ANNEXURE XI

THE NUMBER OF STUD HERDS* INVOLVED AND NUMBER OF PIGS PERFORMANCE TESTED PER STUD HERD FOR THE THREE BREEDS DURING THE PERIOD 1989 – 2002

LARGE WHITE			LANDRACE			DUROC		
Stud Code	Stud Prefix	Number per stud	Stud Code	Stud Prefix	Number per stud	Stud Code	Stud Prefix	Number per stud
11	BC	807	42	BC	728	10	BC	620
18	EWB	295	44	ADB	415	24	RHS	308
26	RHS	11	62	EWB	398	28	HNB	219
37	HJC	164	65	DV	285	36	HJC	13
45	ADB	407	68	LFD	302	60	RYD	10
48	NR	173	74	KNP	116	79	FM	154
56	LSS	949	78	FM	1	156	NRH	32
71	DV	247	323	MJH	90	324	MJH	2
72	LFD	299	360	JAL	31	538	CLF	23
75	KNP	131	423	HX	304	708	VML I	129
80	FM	43	509	NJD	108	845	VML II	5
85	HX	90	642	PBS	33			
93	JAL	38	705	VML I	366			
158	NRH	106	761	E	36			
329	MJH	96	817	WW	12			
424	HX	674	844	VML II	13			
539	CLF	64	2 391		1			
643	PBS	401						
649	DUP	2						
710	VML I	366						
763	E	54						
778	HJC	135						
779	FLE	63						
846	VML II	16						
TOTAL		5 631			3 239			1 515

200

* The number of stud herds involved were 24, 17 & 11 for the Large White, Landrace and Duroc breeds respectively.

ANNEXURE XII

THE EXTENT TO WHICH FOURTEEN OF THE LARGEST PORK PRODUCERS IN SOUTH AFRICA ARE VERTICALLY INTEGRATED

Producer Code	Herd Size	Own Stud	Own AI Station	Own Feedmill	Own Mixing	Own Planting	Abattoir		
							Own	Shares	Other*
KANHYM	7 500	✓	✓	✓	✓	✓			✓
GRTP	6 000							✓	
GBK	3 500	✓	✓		✓	?			✓
PMF	2 500	✓	✓		✓			✓	✓
IBSP	2 000		✓(?)		✓				✓
JPVW	1 800				✓	✓			✓
HSB	1 600				✓	✓			✓
GILP	1 400				✓				✓
TAAB	1 400		✓(?)		✓				✓
CWP	1 200				✓	✓			✓
INHB	1 200		✓		✓	✓			✓
PGRB	1 200				✓	✓	✓		✓
LSSF	1 100	✓	✓		✓			✓	✓
AEVB	1 000		✓	✓	✓		?	✓	✓

* Other refers to a contract / quota with existing abattoirs

? = Uncertain.

ANNEXURE XIII

COMPILATION OF THE GENETIC GROUPS BASED ON YEAR OF BIRTH AND COUNTRY OF ORIGIN

YEAR OF BIRTH	COUNTRY OF ORIGIN
1970 – 1979	(Germany, Ireland
1980 – 1989	USA, United Kingdom,
1990 – 1992	Finland, France,
1993 – 1994	The Netherlands,
1995 – 1996	Canada, Norway,
1997 – 1998	South Africa,
1999 – 2000	Unknown)
2001 – 2002	

Where available, distinction was made between group and individual testing, as well as whether a carcass or production index was used in the country of origin.