

## CHAPTER II

### THE CHANGING AGRICULTURAL ENVIRONMENT - EXTENDING THE GENOTYPE A STEP FURTHER

*"Først og fremst at se paa tingene kundens side av disken"*

*Try to look at the situation.....from the consumer side of the counter*

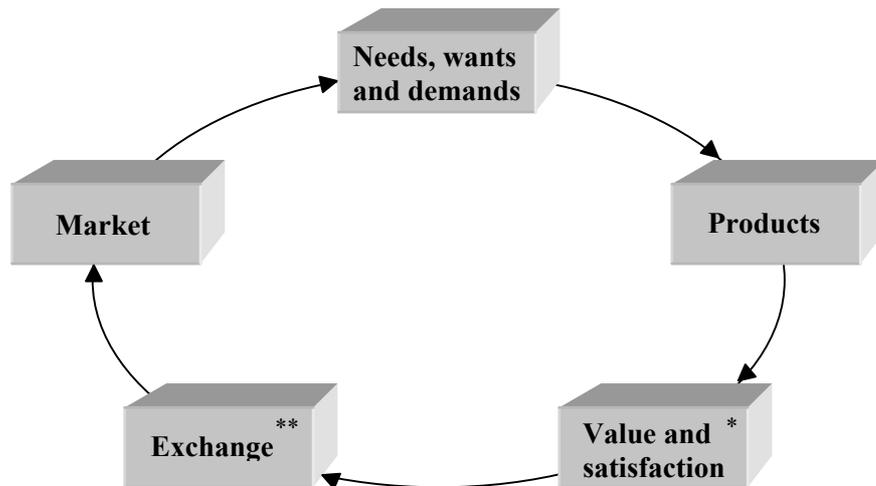
- Robert Millars, 1916 - Norway

#### 2.1 INTRODUCTION

The marketing environment is a dynamic arena continuously exposed to a continuum and latitude of changes resulting in uncertainty, barriers and opportunities. Consequently the marketing environment must be monitored constantly (Chisnell, 1992) to minimize risks, re-organise and/or capitalize on opportunities (Cowan, 1994; Skinner, 1994; Le Boeuf, 1997).

According to Wierenga, Van Tilburg, Grunert, Steenkamp & Wedel (1998) the very same principles and approaches that apply to marketing in general, also apply to marketing in the agrifood chain/sector. Marketing in the agrifood chain should always be a combined effort between several parties, stretching from the original producer (thus at conception) to the ultimate consumer (consumption). Furthermore modern consumers also want to know the origin and production processes (traceability) of the products they buy (Wierenga, 1998).

One of the essential ingredients of successful marketing is *satisfying consumer needs*. According to Oosthuizen (1995), the traditional approach to the *four P's* (product, price, place and promotion) has gone. For current and future times the *four C's* (consumer, cost, convenience and communication) will determine success. Kordupleski, Rust & Zahorik (1993) indicated that any effective organisation will listen carefully to its consumers and serve them effectively, pursuing total quality, thus completely satisfying consumers on the full range of product and service needs. In this regard Kotler & Armstrong (1994), refer to *the marketing concept* as: "... determining the needs and wants of target markets and delivering the desired satisfactions more effectively and efficiently than competitors do". Furthermore consumers view products as bundles of benefits. They will purchase those bundles with the most benefits (value) for their money and in the process satisfying a want or need (Vide Fig 2.1).



**Fig 2.1 The core concepts of marketing (Kotler & Armstrong, 1994)**

\* Refer to meeting the needs in a profitable manner

\*\* Exchange of transactions and relationships

*The core concepts are linked and each concept is linked on the one before it. Thus the real purpose of marketing is to generate consumer value at a profit.*

To position itself for the future the South African pig industry should concentrate on focused differentiation, based on a quality product with a sound genetic basis (the real departure point) is the route to pursue. It will be difficult (almost impossible) to compete with chicken on a per cost basis (production efficiency basis). The pork industry has the ability to produce versatile products with superior value, originating from healthy pigs (which had been carefully selected, bred and raised) which comply with consumer demands. Given the changing (marketing) environment and its impact on agricultural products, a first effort will be made in this chapter (supported by research findings and local market surveys) to commence with the interaction between meat quality, genetics and the consumer.

## 2.2 THE CHANGING MARKETING ENVIRONMENT

Ohmae (1989) summarized the modern day situation as follows: *"Everyone - and everything - else is simply part of the rest of the world. People everywhere are able to get the information they want - directly from all corners of the world. They can now easily distinguish what the tastes, fashion styles, preferences and lifestyles in other countries are."*

According to Kotler & Armstrong (1994) many companies (including powerful international companies) that are struggling financially, failed at the heartbeat of marketing, namely:

- failing to understand the changing environment;
- failing to understand their consumers and
- failing to provide value - a basic inherent need of the consumer.

Cowan (1994) indicated that some of the world's largest companies such as General Motors and IBM, have been brought to their knees for the same reason - *failing to adapt to the profound changes of their markets, failing to take their consumers seriously*. On the contrary, many of the most successful companies in the world such as Disney, Caterpillar and McDonalds, are obsessed with consumer satisfaction - they provide exceptional quality, service and reliability accordingly (Skinner, 1994).

According to Cohen & Huchzermeier (1999) certain major changes have contributed to the state of transition that is manifested in today's global economic environment. These changes are:

- worldwide reduction of trade barriers
- consumerism, manifested in a quest for value, variety and availability
- increased volatility in financial markets.

## **2.2.1 GLOBAL TRENDS**

### **2.2.1.1 Globalization**

Internationalization (the new single market culture) is a universal phenomenon. Markets, geographical boundaries and cultures have shrunk due to the impact of technology and essentially the electronic revolution (Kotler & Armstrong, 1994; Zimmerli, 2000). Traditional patterns are disintegrating and technology is driving society at an alarming rate (Johnson, 2000). The direction and pace of techno trends is difficult to predict and the outcome too decisive to contemplate - in fact we are living in a risk society.

Consumers across continents and across international capitals (from New York to Stockholm and Milan) show more and obvious similarities (Johnson, 2000). According to Oosthuizen (1995) characteristics of global consumers manifest themselves mainly in the domains of food, fashion and pleasure. Given the rapid nature of globalization, Steenkamp (1998) is of the opinion that due consideration be given to international differences in food consumer behaviour. Graeber (2000) is of the opinion that real globalization essentially means the following:

- *free immigration* - across the visible and invisible borders
- a *global rule of law*, thus the formation of a uniform world-wide legal institution
- *reduction in all forms of protectionism* or even elimination thereof and
- *standardisation* pertaining to products and licensing.

THUS

*Globalization in the true sense of the word means releasing the average world citizen of restrictions previously imposed upon him/her.*

Due to the effect of globalization, agriculture and agricultural products and markets (also in South Africa) are becoming increasingly more international. According to Meulenberg (1998) and Stein (2000) agri-businesses are becoming conglomerates whilst simultaneously focusing on innovation and product quality. These businesses give preference to the promotion of their own products and brands rather than to pursue generic promotion. Den Hartog (1999) indicates an intensification (driven by technology) of pig production in most European countries manifested in fewer farms with pigs, but more pigs per farm. According to Streicher (2001) the same phenomenon is also happening in South Africa.

Van Zyl (1990) indicated that agriculture is continuously subjected to a continuum of changes ranging from climatic variability and globalization to the information revolution and the genetic revolution; from preferences, attitudes and behaviour of the consumer to extreme media vulnerability (Vide ANNEXURE III).

The unexpected outbreak of Foot and Mouth Disease (FMD) in September 2000 in the Camperdown district of Kwazulu-Natal (and subsequently also in Middelburg and Bushbuckridge) and the outbreak of FMD in France, England and Latin America during 2001 is indicative of media vulnerability (exploitation) and the paralysing effect thereof on the national and international image of a livestock industry and the final rejection and aversion of meat products.

#### **2.2.1.2 Information Technology**

The intensification of the Information Technology (IT) Revolution is, according to Shapiro (2001), manifested by means of:

- markedly improved efficiency in the computing speed and application of personal computers
- improved power and flexibility of data management software
- implementation of enterprise resource planning systems (ERP-Systems)
- gigantic leaps in e-commerce (enhanced by accessibility, low cost and speed).

Chen (1999) indicated that information technology has not only led to an unimaginable proliferation of data and knowledge in supply chains, but also to smaller lead times and smaller batch sizes. According to Shapiro (2001), e-commerce has culminated in new and better marketing opportunities, as well as improved supply chain management. E-commerce is not only manifested in direct business-to-consumer marketing, but also business-to-business marketing and communication.

According to Wierenga (1998), Information Technology (IT) is the most dynamic key factor that drives change in the agricultural and/or food sector. Information technology will in future become invaluable to ascertain consumer preferences, consumer trends and their spending power/patterns timeously, instantly and effectively. Point of sale scanning (registering sales continuously) has become synonymous with many (the majority of) retail companies. Information technology has already become inseparable from superior logistic alliances. Zimmerli (2000) indicated that an electronic communication network is a necessity for successful globalization. The Internet has more than satisfied this requirement. **Grulke (2000) indicated that the Internet has indeed become the epitome of "globalness" and openness.**

According to Meulenbergh (1998) modern retail chains in Holland use information technology to internationalize their purchasing of food products. They will buy and redistribute flowers from Kenya and Taiwan, wines from South Africa, Chili, Australia and France and vegetables from Morocco. Markets have become more open due to substantial global trade agreements including GATT and WTO negotiations.

### **2.2.1.3 Biotechnology**

Grulke (2000) described the age of Biotechnology as the Second Information Revolution. A world where...*"the sciences of miniaturisation, genome research and nanotechnology would set the scene for the creation of whole new genres of life - whether it be crops, drugs or synthetic materials"*. According to Mc Clintic (2000) a new revolution, fueled by biotechnology, is changing traditional agriculture into a far-reaching and totally new concept (paradigm) with permanent effects. Kappes (1999) indicated that new technologies in the field of genome research will drastically change future livestock selection practices.

Biotechnology, the undisputed futuristic spiral of molecular genetic advancement in human, plant, animal and micro organisms has created social concerns, ethical fears, rejection and prejudices in

societies and amongst consumers. Food safety and consumerism has subsequently become synonymous with biotechnology in recent years. The impact of biotechnology in agriculture and ultimately the society and the consumer has been inundated with fear, rejection, negative media publication, protests and international (moral) support (mostly against it). Primarily the most sensational matters are genetically modified (GM) foods and cloning. As a result of intense pressure from organisations such as Greenpeace, major supermarkets<sup>3</sup> and food producers in the United Kingdom have already switched to **GM-free animal feed and products**. In the United States of America, two prominent multi-national companies (McDonalds and Burger King) announced that they will become GM-free during the course of 2001. Bonneau & Laarveld (1999) have compiled a list of factors that will govern the acceptance of animal biotechnology in society (Vide Table 2.1).

In South Africa the food company Woolworths Foods is making a concerted effort to ensure that all products are GM-free in the next three years and labeled accordingly. (De Bruyn, 2003). The company Pick 'n Pay has embarked on the “Country Reared Program”, where food products must be free of residues and antibiotics.

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<sup>3</sup> <http://www.connectotel.com/gmfood/>.

*Norfolk Shoppers tell Bernard Matthews to stuff his GM turkeys , 12 Dec 2000 08h46*

**Table 2.1 Factors that will govern the acceptance of animal biotechnology in society (Bonneau & Laarveld, 1999)**

FACTOR		CONCERN
(i) <b>Ethical concerns</b>	(i)	Animals are more closely related to humans than plants and are subsequently questioned much more
(ii) <b>Risk</b>	(ii)	What is the impact on food safety and the environment?
(iii) <b>Welfare of animals</b>	(iii)	To what extent is it conducive or detrimental to the welfare of animals?
(iv) <b>Benefit: Trivial or real</b>	(iv)	Who are the beneficiaries? The consumer, the producer, the agri-industry or all of these?
(v) <b>Socio-economic impact</b>	(v)	What is the effect of rapid technology change on the farming and rural structure?

The vivification of biotechnology in agriculture is seen from horticulture (for example genetically manifested maize that is insect resistant and pesticide tolerant, but has an improved amino acid and oil content, thus improving its value as food) to quantitative trait loci (QTL's), gene mapping (Vide Table 2.2), genome scanning, transgenesis, cloning, *in vitro* reproduction, sperm sexing technology (in cattle and pigs) and embryo transfer (surgical and non surgical) in livestock production (Vide Table 2.3). According to Cunningham (1999), the improvement of the nutritional value of forages by means of genetic engineering is a popular field in plant breeding research with causal effects on the livestock production chain.

According to Ollivier (1999), it may be rewarding to invest money in future technology leaps, such as the improved efficiency of nuclear transfer from cultured cells. Kappes (1999) regarded transgenic and nuclear transfer as applications for the rapid introgression of alleles into a new population. Smidt & Niemann (1999) indicate that nuclear transfer has the potential to generate more identical offspring. However, Visscher, Pong-Wong, Whittemore and Haley (2000) regard the real benefit of nuclear transfer the inherent in the possibility to reduce the genetic lag between the nucleus, multiplier and commercial tiers through the cloning of genetically superior performance tested animals. This may be theoretical and surgically possible, but has the inherent danger of reduction of genetic variation of populations in the long run.

According to Kappes (1999) there has been a drastic increase in the number of reported quantitative trait loci (QTL's) for traits such as milk production, growth, reproduction and disease resistance. This trend is likely to increase in future (Van Zyl, 2001). Despite the increase in reported quantitative trait loci (QTL's), only a restricted number of genes have been identified from these quantitative trait loci. It is envisaged that the sequencing of the entire human genome will be completed before 2005 (Kappes, 1999).

**Table 2.2 The current status of the genome maps in the different species (After Cunningham, 1999)**

SPECIES	Genetic Markers Mapped	Coverage of Genome	WEB PAGE
Human	> 15 000	~ 95 %	<a href="http://gdbwww.gdb.org/">http://gdbwww.gdb.org/</a> <a href="http://www-genome.wi.mit.edu/">http://www-genome.wi.mit.edu/</a>
Mouse	> 14 000	~ 100 %	<a href="http://www.informatics.jax.org/">http://www.informatics.jax.org/</a> <a href="http://gdbwww.gdb.org/">http://gdbwww.gdb.org/</a>
Cattle	> 870	~ 90 %	<a href="http://sol.marc.usda.gov/genome/cattle/cattle.html">http://sol.marc.usda.gov/genome/cattle/cattle.html</a> <a href="http://www.ri.bbsrc.ac.uk/bovmap.html">http://www.ri.bbsrc.ac.uk/bovmap.html</a>
Sheep	> 250	~ 75 %	<a href="http://dirk.invermay.cri.nz/">http://dirk.invermay.cri.nz/</a> <a href="http://tetra.gig.usda.gov:8400/sheepgbase/manager.html">http://tetra.gig.usda.gov:8400/sheepgbase/manager.html</a>
Pig	> 2 000	~ 90 %	<a href="http://www.public.iastate.edu/~pigmap/pigmap.html">http://www.public.iastate.edu/~pigmap/pigmap.html</a> <a href="http://sol.marc.usda.gov/genome/swine/swine.html">http://sol.marc.usda.gov/genome/swine/swine.html</a> <a href="http://www.ri.bbsrc.ac.uk/pigmap/pig_genome_mapping.html">http://www.ri.bbsrc.ac.uk/pigmap/pig_genome_mapping.html</a> <a href="http://tetra.gig.usda.gov:8400/pigbase/manager.html">http://tetra.gig.usda.gov:8400/pigbase/manager.html</a> <a href="http://ws4.niai.affrc.go.jp/dbsearch2/jgbase.html">http://ws4.niai.affrc.go.jp/dbsearch2/jgbase.html</a> <a href="http://www.toulouse.inra.fr/tgc/pig/compare.html">http://www.toulouse.inra.fr/tgc/pig/compare.html</a>
Chicken	> 600	~ 90 %	<a href="http://poultry.mph.msu.edu/">http://poultry.mph.msu.edu/</a> <a href="http://www.ri.bbsrc.ac.uk/chickmap/">http://www.ri.bbsrc.ac.uk/chickmap/</a>
Horse	> 300	~ 85 %	<a href="http://www.vgl.ucdavis.edu/~lvmillon">http://www.vgl.ucdavis.edu/~lvmillon</a> <a href="http://www.ri.bbsrc.ac.uk/horsemap/">http://www.ri.bbsrc.ac.uk/horsemap/</a>
Other*			

\* A catalogue of inherited disorders in all the major species of domesticated livestock can be perused at the web page:  
<http://www.angis.org.au/Databases/BIRX>

The utilization of biotechnology to enhance reproductive efficiency and inherent genetic improvement of farm animals is interwoven with different fields of biotechnology such as those applicable to the nutrition, physiology and health of farm animals. A comprehensive review in this regard is given by Bonneau & Laarveld (1999). The use of arginine and aspartic acid as stimulants to release somatotropin from the pituitary to enhance growth rate and carcass quality must be

noted in this regard. According to Cunningham (1999)... "it is quite often the interactions between technologies that provide the opportunities for progress".

**Table 2.3 Different biotechnologies and application levels thereof in the pig breeding industry [Adapted from Cunningham (1999) and Bonneau & Laarveld (1999)]**

TYPE OF BIOTECHNOLOGY	Level of application in the pig industry			
	HIGH	MODERATE	LIMITED	UNCERTAIN
Artificial Insemination	✓			
Embryo Transfer	←-----	✓-----→		
<i>In Vitro</i> Maturation				✓
Sexing of Semen	←-----	✓		
Embryo Cryopreservation	←-----	←-----	-----	✓
Cloning	←-----	←-----	-----	✓-----→
Nuclear Transfer	←-----	✓		
Transgenic Animals	←-----		←-----	✓-----→
Genome Maps	✓			
Marker Assisted Selection	✓			
DNA technology linked to traceability	←-----	✓		
Immuno-modulation*	←-----	✓		
Utilization of Porcine Somatropin	←-----	✓-----→		
Insulin Growth Factor-1 (IGF-1)**	←-----	✓-----→		
Transfer of disease resistant genes	←-----		←-----	✓
QTL Mapping	←-----	✓		

\* This technique (which entails chemical castration) is used in pigs to avoid boar taint in meat

\*\* The concentration of this (mitogenic) hormone in blood is highly correlated with growth, but it's biological activity is extremely complex

← The arrows indicate the direction this technology could move in future

#### 2.2.1.4 Strategic International Re-orientation

Agricultural marketing channels are becoming marketing chains (or vertical marketing systems) and these marketing chains are characterised by well-co-ordinated marketing policies (Meulenberg, 1998). In this regard Van Trijp, Steenkamp & Candel (1998) indicated that quality

differentiation is likely to become an increasingly important strategy in future agricultural marketing. Manufacturing companies of branded consumer products are becoming major roleplayers in the agrifood channel (Wierenga, 1998). Consequently, the agri-businesses of the future (who have decided to survive financially and stay internationally competitive) must embrace and implement the concept of Agrifood Value-Adding Partnerships (Grunert, 1998). Stein (2000) stated that even Wall-Mart (the retail giant in the USA) is establishing **super centres** where vast amounts of meat (including pork) are sold at markedly reduced prices. The sourcing of meat is done directly from the processors - thus enhancing low cost competitiveness even further, whilst neutralizing small independent stores which also distribute perishable and non-perishable agricultural products. Wall-Mart is furthermore transmitting sales data dualistically to its warehouses and suppliers via its own satellite communication system (Stalk, Evans and Shulman, 1992 as quoted by Chen, 1999).

#### **2.2.1.5 Welfare, Health and Environmental Awareness**

Animal welfare is one of the major fields of public concern and political issues for future directions in animal husbandry. In certain European countries, such as England, Holland and Belgium, the animal welfare concerned consumers may not only cease their meat eating habits (if production systems and norms do not comply with their convictions), but they will (emotionally) take revenge and radical actions into their own hands (Rymher, 1995 - Personal Communication).

The use of stalls and tethers for dry sows has been banned by British legislation since the mid-1990's. In Germany, regulations (pertaining to animal protection) have already been issued for the housing and management of laying hens, pigs and calves during 1987, 1988 and 1992 respectively (Visser, 1995). In the Netherlands (Vide Table 2.4) new rules and regulations, based on the minimum requirements laid down by the European Union (EU), were introduced during 1998. This was done not only to improve the welfare of pigs in intensive production systems, but also to change the format of pig housing considerably (Den Hartog, 1999). Intensive pig production in the Netherlands is handicapped by welfare, health and environmental aspects, ranging from environmental pollution, mineral excretion, ammonia emission to the legislation on pig housing and welfare. In this regard, environmentally friendly packaging is becoming an increasingly important marketing tool (Stenkamp, 1998).

**Table 2.4 Categorical differences between the current EU legislation and the Dutch legislation on pig housing and welfare (Den Hartog, 1999)**

TYPE OF PIG	EU Regulations 1991	Dutch "Varkensbesluit" 1998
<b>Weaner pigs</b>	<ul style="list-style-type: none"> <li>• Minimise mixing after weaning</li> </ul>	<ul style="list-style-type: none"> <li>• Mixing after weaning is allowed once</li> <li>• Thereafter stable groups are compulsory</li> </ul>
<b>Finishing pigs</b>	<ul style="list-style-type: none"> <li>• No requirements for solid floor area</li> <li>• Minimum space defined: 0.60 m<sup>2</sup> per animal at 100 kg weight</li> </ul>	<ul style="list-style-type: none"> <li>• Minimum solid floor area is defined at: 0.30 m<sup>2</sup> at 100 kg live weight</li> <li>• Minimum space increased to: 1.0 m<sup>2</sup> per animal at 100 kg weight</li> </ul>
<b>Dry sows</b>	<ul style="list-style-type: none"> <li>• Tethering illegal from 2008 (crates still allowed)</li> <li>• No minimum floor space</li> <li>• No legislation on roughage</li> </ul>	<ul style="list-style-type: none"> <li>• Group housing compulsory from 2002</li> <li>• Minimum floor space of 2.25 m<sup>2</sup> per sow of which 1.3 m<sup>2</sup> is solid</li> <li>• Some roughage has to be provided</li> </ul>

The farmers of the future will be compensated for the quality of their products on condition that they comply with stringent quality, welfare and food security specifications, **even before products depart from the farm** (Mc Clintic, 2000). Biotechnology linked with modern information technology /coding will indeed enhance the above-mentioned concept of traceability through the entire supply chain - from the field to the fork. Verbeke, Doyer & Visser (2001) indicated that *"...one of the most paramount innovations that livestock and meat production chains go through during recent periods, is the demand-driven development of supply chain management and traceability"*.

#### 2.2.1.6 Consumerism

A detailed discussion of consumer trends is given in section 2.3, but warrants prior explanation. According to Issanchou (1996) the meat industry is rapidly changing from being a historical **production led** industry to being a **consumer driven** industry. The declining per capita consumption of red meat is furthermore an international phenomenon. This trend is furthermore linked to product safety and product traceability (Issanchou, 1996; Wierenga, 1998; Verbeke *et al.*, 2001).

The establishment of mega stores or supermarket chains has an advantageous effect on consumer behaviour. Steenkamp (1998) indicated the following implicit advantages:

- because a one-stop shopping venue is created, consumer convenience is triggered
- a wider product assortment is conducive to variety seeking and innovative behaviour, thus facilitating impulse buying
- effective in-store promotion is exemplified by more space and a higher density of consumers at almost any point in time
- quality can be guaranteed due to improved and high technology refrigeration facilities
- faster turnaround times of products - ensuring continuous freshness of especially perishable products.

The face of retailing and shopping has changed forever. With regard to retailing, especially the way consumers shop, the emphasis has shifted from a supply chain basis to a demand chain basis (Johnson, 2000). Consumer demand for organically produced agricultural products is growing. In the Netherlands alone it is envisaged that the number of organically produced pigs, (that are being slaughtered annually), will increase from 14 000 tons (in 1998) to approximately 500 000 tons (in 2005) (Den Hartog, 1999). This trend represents an envisaged compounded growth rate of approximately 500 percent per annum!

### **2.3 CONSUMER TRENDS**

Skinner (1994) indicated that American consumer tastes are moving away from red meat, fried foods, cholesterol and salt. South African consumers, as their European counterparts, are swiftly moving away from traditional purchasing (no specific requirements) to new ways (insisting on convenience, quality and safety) of purchasing patterns (Johnson, 2000). According to Grunert, Harmsen, Larsen, Sorensen & Bisp (1998) the *consumer of the future* will be less predictable, less consistent and more fragmented. Wierenga (1998) indicated the following changes in consumer patterns pertaining to product quality:

- the pursuit for quality and value is stronger than before
- inherent convenience (relating to the combination of products and shopping)
- smaller portions and more variation thereof
- must be conducive to better health and safety
- traceability (consumers want to know the origins and production processes of the products they buy)
- compliance with sound animal welfare standards.

Consumer trends are also related to other trends in the economy (Vide 2.2.1). According to Hofmeyr (1997) and Meulenberg (1998) modern consumer demands are synonymous with health, safety and convenience. In a Belgium consumer study, including 320 personal interviews, Verbeke, Van Oeckel, Warnants, Viaene & Boucque (1999) concluded that the perceived demand shifts away from meat are attributed *inter alia* to:

- increasing health concerns
- convenience motives<sup>4</sup>
- acceptable products - based on safe raw materials

Consumers have less time to buy, prepare and consume products (Wierenga, 1998). The criteria of convenience is also supported by Issanchou (1996) indicating that consumers look for fast and easy-to-prepare products. Johnson (2000) indicated that modern consumers are moving away from value *per se* to differentiated benefits (values) such as value-for-time and perfect experiences. The pursuit for shopping is changing from functional (where speed, function and accuracy prevailed) to experiential (where browsing and recreation is part of the shopping experience). This phenomenon is imposed by longer business hours of retail stores and a much wider product continuum/assortment/range, exhibiting and selling national and global brands simultaneously.

### 2.3.1 Consumer Needs

Consumers make decisions based on their perception of a product's value - thus the guiding factor is consumer value. A satisfied consumer is one who perceives quality at or above expectations. In situations where products and services fail to live up to the expectations/desires of the consumer - not only will repeat sales to the said consumers be lost, but even more important *...future chances of selling to them, their friends and acquaintances are being reduced substantially* (Chisnell, 1992). Consequently consumer needs must first be determined and once ascertained, it is desirable to measure perceived quality (Kordupleski *et al.*, 1993). A satisfied consumer is therefore more likely to be retained as a consumer and to be engaged in a positive word-of-mouth. Higher educated people tend to attach more weight to neutral sources of information, ethical criteria and environmental friendliness of the product (Steenkamp, 1998).

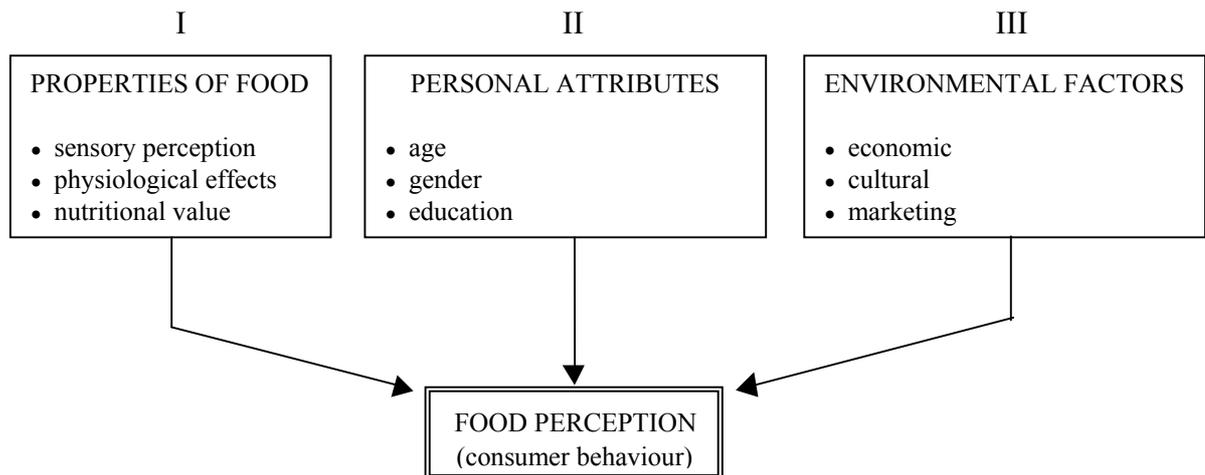
According to Verbeke *et al.* (1999), with regard to the perception of meat in Belgium, consumers must first be totally satisfied with the sensory qualities of a product, before other quality aspects will become relevant. Consumers are often involved in inferential behaviour processes.

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<sup>4</sup> Convenience as far as the consumption of pork is concerned, refers to appearance, packaging, serving size, labelling, ease of preparation and availability (Andersen, 1999)

Informational stimuli (mostly prior to consumption) such as brand name, country of origin, store image, etc., can influence perceptions of attributes and ultimately also values (Steenkamp, 1998).

Fig 2.2 gives an indication of the three major factors that will influence the consumer's perception of food, thus his/her behaviour.



**Fig 2.2 The three major factors influencing the perception of food or consumer behaviour (Steenkamp, 1998)**

### 2.3.2 Consumer Satisfaction and Market Share

Retention rate of consumers is viewed as the most important component of market share (Rust & Zanhorik, 1993; Jacob, 1994) and the inherent driving force behind this is consumer satisfaction.

Consumers generate substantially more profits for every consecutive year they do business with a company. The estimated profit from a fourth year consumer is worth more than three times compared to the profit the same consumer contributed during the first year (Reichheld & Sasser, 1990). The consumer is after all the final judge of quality (Kordupleski *et al.*, 1993). Kotler & Armstrong (1994) stated that a company with wisdom would measure consumer satisfaction regularly - the relationship between the consumer's expectations on the one hand and the product's perceived performance/experience on the other hand, will eventually determine whether the buyer is satisfied or not.

### 2.3.3 Consumer Satisfaction and Health Matters

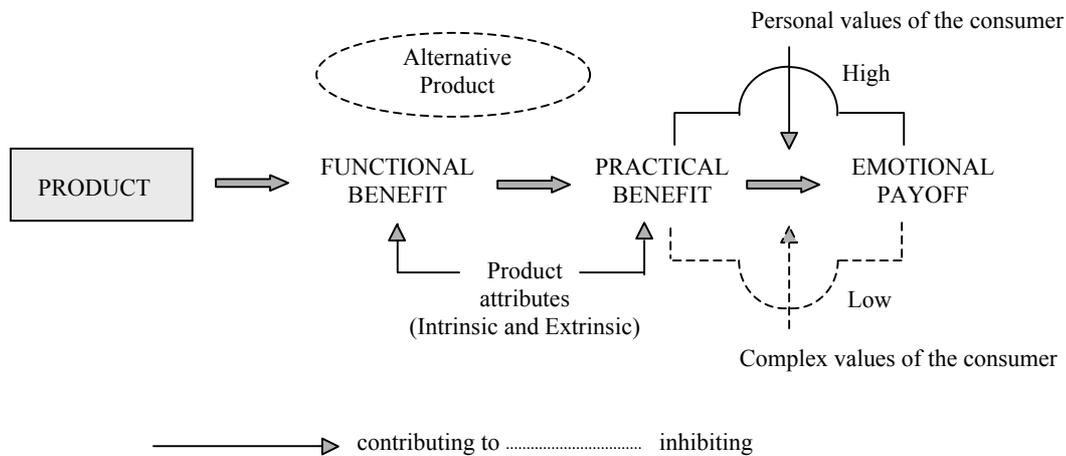
Food safety has become a very contentious issue in recent years (Vide 2.2.1.3). This is aggravated by the fear of residues, antibiotics, hormones and genetically modified foods. As indicated by Verbeke *et al.*, (1999) the over-reacting role of the media elicits negative consumer behaviour and reaction. Modern consumers - globally spoken, are well informed, extremely sensitive and overwhelmingly health conscious. Further aspects such as safety and pathogens can change the consumer's perception of quality rapidly - the so-called **exogenous** (media enforced) **triggers** (Issanchou, 1996). The trend towards healthy (low fat) products and convenience products is known as **awareness triggers**. According to Issanchou (1996) *consumers are indeed sensitive to sensory changes of food products* even when they cannot describe exactly how different the product is. In this regard Steenkamp (1998) indicates that consumers think of products in terms of their "consequences" and not their "attributes".

## 2.4 PORK - THE PRODUCT ITSELF

Pork is at present the number one source of animal protein in the world today, accounting for no less than 40 percent of world meat consumption (Baker, 1999). Pork is regarded as a consumer product, since it is purchased for personal and/or family consumption. According to Schönfeld (2001) the nutrient content of pork can be regarded as a good source of protein, iron, zinc, as well as a good source of almost all the B-vitamins and an excellent source of thiamin. The protein in pork is complete and also contains all nine essential amino acids required for normal body growth. A fundamental challenge in a product's development, is the translation of consumer demands and preference into physiological aspects of the product (Bredahl, Grunert & Fertin, 1998). The unenviable challenge for the producer and processor is thus to ensure that the end product exhibits high quality when purchased (**expected quality**) and equally good quality when consumed (**experienced quality**). Sensory qualities of meat are important to the consumer. According to Dirinck, De Winne, Casteels & Frigg (1996) the sensory attributes/qualities of meat (colour, tenderness, juiciness and flavour) are conducive to the purchasing behaviour of consumers. These sensory attributes also have a genetic basis. (Table 2.5 gives an indication of the heritability estimates of the most important meat quality traits).

According to Bonner & Nelson (1985) as quoted by Zeithaml (1988) all the sensory signals of perceived quality such as full flavour, good aroma, natural and fresh taste and appetizing looks were relevant across a range of 33 different food products. These attributes can in fact serve as

general indicators of quality across almost all types of products, culminating in the “Emotional Payoff” in Fig 2.3.



**Fig 2.3 The Grey Benefit Chain of Emotional Payoff (Zeithaml, 1988)**

It is envisaged that the consumer of the future will evaluate pork and chicken in more detail than in the past (Verbeke & Viaene, 1999). Although leanness *per se* is viewed by the consumer as an important issue, it is evident that criteria related to meat safety and animal welfare will become increasingly important in Europe, especially the Netherlands and Belgium. Thus fresh meat's vulnerability can be linked to consumer sensitivity or perception sensitivity. Krige (2000) at the South African Pig Producer's Congress in Pietermaritzburg made the following statement pertaining to the South African situation. *"It is more than important to distinguish between the attributes of a product on the one hand and the consumer's perceptions of these attributes on the other hand. The reason being that different consumers (across different cultures) differ in their perceptions. It is the perception that affects behaviour, not the attribute itself."* The outbreak of Foot and Mouth Disease, days after this congress, echoed Krige's sentiments. The demand for pork, especially in Kwazulu-Natal, fell by some 10-15 %. The disease *per se* held no negative health implications for the consumer, although the opposite was perceived!

#### 2.4.1 Product Quality

A product's inherent quality is judged as high or low depending on its relative excellence (or superiority) among those products that are viewed as alternatives/substitutes by the consumer. Furthermore consumers do not easily express quality and its requirements. Many a time it appears to be an elusive and indistinct object - often being mistaken for imprecise adjectives (Parasuraman, Zeithaml & Berry, 1985). **According to Grunert *et al.* (1998) the consumer's perception of**

**food quality is one of the most cumbersome/problematic areas in consumer behaviour research.** The consumer's perception of pork quality is fundamentally much more complex than, for instance, the demands (for pork quality) of the meat processing sector/industry (Andersen, 1999). However, this phenomenon (the quest for pork quality) is aggravated by factors such as:

- Taste and low confidence levels of fresh meat;
- The fact that the product is not always consumed as such, but cooked, processed and blended with other products;
- The fact that meat (pork, beef & mutton) is generally sold unbranded and
- Not many quality cues (pertaining to meat) exist for consumers to rely on.

Andersen (1999) regarded image and reputation of pork as two critical attributes of pork. These two attributes form a blend between the two outer layers of the product, namely the actual product and the augmented product.

Fresh meat (including pork) is regarded as a difficult product to advertise and brand (Verbeke & Viaene, 1999). According to Heinze (2001) branding of fresh meat can be done successfully. A prime example in this regard is the EGO-Schlachthof GmbH Co-operative at Georgsmarienshütte in Germany. This Co-operative with 700 producers is totally vertically integrated, based on strict *quality driven* rules and contracts, from the genetics on the farms to the abattoir and processing plant.

Meat quality needs to be addressed seriously in order to curb the decline of pork consumption in many Western countries (Issanchou, 1996). Quality or perceived quality of a product is not and never will be constant. It will continuously change as the product becomes more or less available, as new products are introduced, as the product ranges of new and established products are extended and as consumers are becoming more sophisticated/informed. However, the genetic basis of meat quality will always be the latent inner inferno for meat quality. Cognizance should mainly be taken of this phenomenon to embrace the concept of quality (on quality) and quality assurance and to exploit it to its full potential.

#### **2.4.2 Meat Quality: Definition and Description**

Bredahl, Grunert & Fertin (1998) define meat quality as follows:

*"The quality criteria of meat refers to taste, tenderness, freshness, juiciness, health and nutritional value."* Andersen (1999) is of the opinion that pork quality should be extended further, to include the following quality criteria: eating, nutritional, technological, health, hygienic and ethnical. Schönfeld (2001) states that quality can best be defined as: *"...those attributes which the public like best and for which they are prepared to pay more than average prices"*. According to

Hoffman (2000) colour and the amount of moisture (water holding capacity) are the two foremost meat quality attributes of lean pork, whilst Andersen (1999) regards water holding capacity as an essential technological quality attribute. These two attributes (colour and water holding capacity) directly influence saleability and yield. Hovenier (1993) regards ultimate pH ( $pH_u$ ) as an important (and heritable) hygienic quality trait.

Colour influences the consumer's acceptance of fresh meat (Bredahl *et al.*, 1998), but PSE (pale, soft, exudative) pork is a highly undesirable condition (from a financial and a consumer point of view) of pork. According to Charley (1982) the aesthetic appreciation of foods and products is accentuated immeasurably by colour. Colour is also used as a quality index pertaining to a number of foods such as:

- (i) The readiness (degree of ripeness) of bananas, oranges and strawberries.
- (ii) Dried fruit (especially apricots) with a bright full orange colour is likely to have more sales appeal than flat, dark and dull apricots.
- (iii) The strength of coffee and tea is also partly judged by the colour.

With reference to the visible and sensory quality characteristics of pork, appearance, tenderness, flavour and juiciness are known as the *primary consumer acceptance criteria of pork* (Andersen, 1999). Appearance *per se* is not an indicative guide to eating quality, but is mainly the *first* impression the consumer gets when buying pork (Hovenier, 1993).

#### **2.4.3 The Genetic Basis of Pork and Meat Quality**

Genetic and non-genetic factors have an inherent influence on meat quality. Non-genetic factors ranging from nutrition, housing, health, transport, lairage to slaughtering and processing (Naude & Visser, 1994; Verbeke *et al.*, 1999). Genetics do influence the quality attributes of pork that will eventually satisfy or dissatisfy the consumer (Vide Table 2.5). Tenderness is regarded as the most important organoleptic characteristic of meat. Genetics is also manifested by major gene effects (Andersen, 1999). For example:

- The MH-gene and RN-gene have a causal negative effect on meat quality traits
- The IMF-gene is believed to optimise the eating quality and tenderness of pork (Hovenier, 1993).

**Table 2.5 The approximate heritability estimates of the sensory attributes of meat quality (Hovenier 1993, Sellier 1998)**

Trait	Heritability estimates	
	(Hovenier, 1993)	(Sellier, 1998)
pH <sub>u</sub> *	0.3	0.15 - 0.2
Water holding capacity (WHC)	0.29	0.15 - 0.2
Meat colour	0.30	0.29
Intramuscular fat (IMF)	0.61	0.50
Tenderness	0.30	0.25 - 0.30
Flavour **	0.10	
Juiciness **	0.10	
Androstenone	0.54	
Meat quality index ***	0.21	

\* *Ultimate pH (24 hours post mortem)*

\*\* *These are subjective traits which are difficult to measure objectively*

\*\*\* *This index is used in the French Central Test Stations to predict technological yield. It is constructed from pH<sub>u</sub>, colour reflectance and water holding capacity (WHC)*

Genetics/heredity (excluding the effects of major genes) account for approximately 30 % of the variation in most pork meat quality characteristics (Verbeke *et al.*, 1999; Andersen, 1999). Webb (1996) on the contrary is of the opinion that the contribution of genetic variation to the eating quality of fresh pork is very small - accounting only for approximately 5 % of total variation. The challenge is to look at the most obvious genetic factors that contribute to or influence meat quality traits (Vide Table 2.5). Most meat quality traits have a heritability range between 0.1 (flavour and juiciness) and 0.3 (pH<sub>u</sub>, WHC, meat colour and tenderness). The latter implicates moderate selection responses (equivalent to feed conversion ratio, feed intake, growth rate) albeit attainable accurately only through meticulous carcass evaluation measurements.

#### **2.4.3.1 The Effect of Breed on Meat Quality**

The effect of breed or genotype (the genetic composition of a breed) can have a marked influence on carcass and meat quality (Huiskes, Binnendijk, Hoofs & Theissen, 1997). Different sire lines and/or breeds are likely to affect carcass composition and meat quality traits such as intramuscular

fat, water holding capacity and colour significantly. In this regard De Vries, Faucitano, Sosnicki and Plastow (1999) indicate inferior meat quality for:

- (i) The Pietrain and Belgian Landrace when compared to the Large White due to a high frequency of the Halothane gene (MH-gene);
- (ii) The Hampshire breed whose meat has a lower water holding capacity (due to a significant lower ultimate pH) and higher corresponding cooking loss which is related to the RN-gene (Sellier, 1998).

The Duroc breed is regarded as a breed inherently conducive to meat quality mainly due to its significantly higher ( $p < 0.05$ ) intramuscular fat content (Edwards, Wood, Moncrieff & Porter, 1992; Hovenier, 1993), whilst the Large White is also seen as a positive contributor to meat quality. Chinese purebred pigs and their crosses, when compared to European and American breeds, exhibit superior meat quality with reference to tenderness, juiciness and tastiness (De Vries *et al.*, 1999; Karlson, Klont & Fernandez, 1999), whilst the meat of the Tamworth, a traditional British pig breed, had the highest acceptability for sensory attributes when compared to the improved breeds.

#### 2.4.3.2 Genetic Correlations

Genetic correlations between the various traits in pig breeding are discussed in more detail in CHAPTER V (Vide Fig 5.6). Genetic correlations between different traits in animals or populations are synonymous with animal breeding. These correlations can be antagonistic (negative) or complimentary (positive). Hovenier (1993) indicated that the genetic and phenotypic correlations between the following parameters are negative or unfavourable:

- (i) lean meat content and meat quality and
- (ii) feed conversion ratio and meat quality

From the above mentioned unfavourable genetic correlations, it can be seen that the producer and consumer have conflicting interests. The former gets compensated on efficiency of production, whilst the latter insists on meat quality which is inversely related to efficiency of production, also known as the **genetic antagonism**. For the producer and consumer the following two phenomena (The Halothane Paradox and The Marbling Paradox) are of utmost importance.

#### **2.4.3.2.1 The Halothane Paradox**

The Halothane gene (MH-gene) is undoubtedly the most extensively discussed and thoroughly researched gene in the entire pig genome (Hermesch, 1997; De Vries *et al.*, 1999; Visser, 2000). This gene contributes to the production efficiency of pigs (Fisher & Mellet, 1997). Sellier (1998) indicated that the carcass lean percentage advantage of nn pigs over NN pigs is approximately one phenotypic standard deviation (2-5 %). Although the MH-gene has an additive effect on efficiency of production, lean meat yield, dressing percentage and carcass length, it is inherently accompanied by an increased tendency to PSE (pale, soft and exudative) meat (Webb, 1996). Deterioration in meat quality aspects, such as colour and water holding capacity (De Vries *et al.*, 1999), a higher mechanical resistance and cooking loss in cooked meat (Monin, Larzul, Le Roy, Culioli, Mourot, Rousset-Akrim, Talmant, Touraille & Sellier, 1999) as well as reduced tenderness and juiciness (Bredahl *et al.*, 1998) is furthermore associated with sudden and in-transit deaths (Nel, Parfitt, Weyermans & Harris, 1993). The PSE phenomenon, according to research conducted in South Africa, is not exclusively linked to stress susceptible pigs or pigs that possess the halothane gene, but incorrect preslaughter procedures are conducive to this phenomenon even in halothane negative pigs (Nel *et al.*, 1993; Fisher & Mellet, 1997). The above mentioned genetic condition (or acute stress syndrome) is caused by a single point mutation at position 1843 on chromosome 6 for the skeletal muscle, ryanodine receptor, affecting the calcium channel (Fuji, Otsu, Zorzato, De Leon, Khana, Weiler, O'Brien & McLennan, 1991; McGlone, Désautés, Morméde & Heup, 1998). This defect is related to the movement (osmotic diffusion) of  $Ca^{++}$  ions through the sarcoplasmic reticulum membrane.  $Ca^{++}$  ions are therefore elevated in the muscles of stress susceptible pigs (Hermesch, 1997). With the advent of DNA molecular diagnostic assays, this mutation can be precisely detected and dealt with or eliminated.

#### **2.4.3.2.2 The Marbling Paradox**

The Duroc breed is renowned for its significantly higher intramuscular fat content (Vide paragraph 2.4.3.1). De Vries *et al.* (1999) indicated that there is a substantially higher percentage intramuscular fat for the Duroc (often twofold higher) when compared to the Large White and Landrace breeds. The negative influence related to health [based on the positive correlation between intramuscular fat and backfat thickness, thus reducing the consumers perception of meat quality (Bredahl *et al.*, 1998; Sellier, 1998)] competes with the positive influence of intramuscular fat content on tenderness, juiciness and flavour (Barton Gade & Bejerholm, 1985; Sellier, 1998). The Marbling Paradox is furthermore exacerbated by the fact that the meat sensory attributes (tenderness, juiciness and flavour) of Duroc and Duroc crosses are counteracted by a prolonged period to clean carcasses in the abattoir (due to pronounced hair follicles), a lower lean meat yield,

poorer feed efficiency and inferior reproductive efficiency of this breed. (Vide ANNEXURE I: Results for the traits measured at the three central test stations in South Africa during the year 2000 for the different breeds and sexes). Finally, Sellier (1998) indicated that a number of researchers could not find a significant phenotypic correlation between marbling and tenderness.

## **2.5 POSITIONING AND ASCERTAINING THE ATTRIBUTES OF PORK IN RELATION TO OTHER TYPES OF MEAT IN SOUTH AFRICA DURING THE PERIOD 1970 TO 2000**

### **2.5.1 Historical Overview**

Over the past three decades a substantial number of market, consumer and attitude surveys were conducted in South Africa (mainly for the former Meat Board) to ascertain consumer perceptions, trends and competitiveness of the various meat types in relation to each other.

The quest for pork quality has always been, and will be, a continuous pursuit. Pork's quality attributes cannot be expressed in exact or mathematical terms, but should be viewed from a holistic point of view incorporating many disciplines across time frames and be inseparable or interwoven with *consumer* satisfaction, preferences and trends. Thus, the rationale for this part of the study is to give an overview of *consumer* meat usage patterns, trends and preferences in South Africa from 1970 to 2000 based on the more important market surveys that had been conducted in South Africa during this period.

#### **2.5.1.1 The 1970 Market Survey**

Market Research Africa (1970) conducted a market survey, limited to 500 households representing the average South African European housewife, aged 16 and older. The households were in the metropolitan clusters and cities around Johannesburg, Pretoria, Cape Town and Durban. The *objectives* of the survey were to *measure* (i) the effectiveness of a pork advertising campaign in the preceding 12 months as well as (ii) the buying habits and (iii) the meat usage of consumers. User groups were classified as:

- High user* - spending more than R30 per month on meat
- Medium user* - spending between R15 - R29 per month on meat
- Low user* - spending no more than R14 per month on meat

From this survey the following conclusions were drawn:

Seventy four percent of the respondents bought their meat at *the butcher* and 69 % told him what they wanted. Eighty one percent of respondents bought meat at least once a week. Sixty one percent of respondents bought by weight and only 26 % by price. In 88 % of the cases the *housewife was the sole decision-maker* and in 76 % the purchaser of meat. Eighty percent of *respondents bought cash and none with their credit cards!*

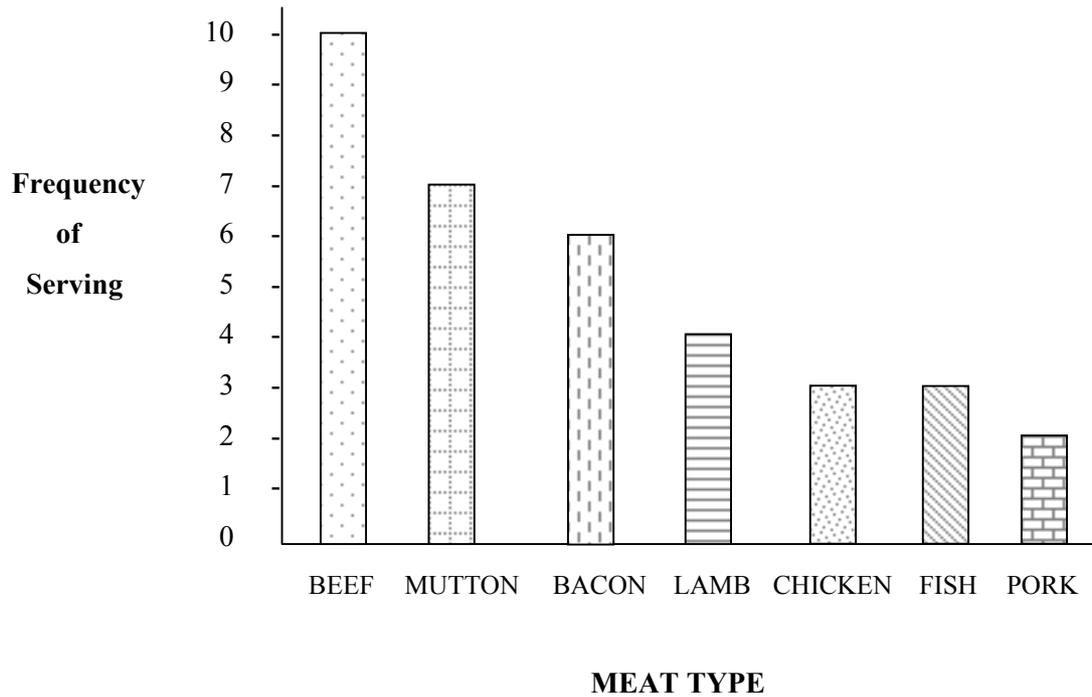
Already in 1970 fifty percent of respondents preferred to buy pre-packed meat, mainly from a time, convenience, health and quality point of view!

The *three most important quality criteria* for consumers when buying their meat were:

1. The leanest possible meat (32 %)
2. Colour (good, fresh, red, pleasing) (30 %)
3. Freshness (20 %)

The *importance of colour* of the meat *per se* was very important for 69 % of the respondents, fairly important to 20 % and to only 2 % not important at all. *Tenderness* of meat followed almost the identical pattern as colour. Seventy three percent of respondents rated tenderness as very important and 21 % of respondents as fairly important. The *price* of the meat was very important to only 37 % of respondents. Twelve percent of respondents indicated the importance of the *amount of fat* on the cut, whilst only 9 % indicated the importance of the *amount of meat* on a chop.

During a period of one month no less than 93 % of respondents served beef, 83 % chicken, 74 % mutton, 73 % fish, 64 % bacon, 57 % lamb, 52 % pork and 17 % veal - *thus pork was the second least frequently served*. In terms of *family favourite*, 37 % of the respondents indicated that beef was first followed by mutton (27%), lamb (16 %), pork (7 %), chicken (5 %), veal (1 %) and fish (1 %). Forty seven percent of respondents had a *preference for few, but larger pork chops* and 29 % for more but small chops. The average monthly expenditure on meat was a mere R21.



**Fig 2.4 The frequency of serving different meat types every four weeks (Market Research Africa, 1970)**

From Fig 2.4 it is clear that pork was the least frequently served meat, three times less than bacon and five times less than beef!

#### **2.5.1.2 The 1987 Market Survey**

The 1987 meat usage and attitude survey conducted by Market Research Africa (MRA) for the Meat Board encompassed a comprehensive project involving *three stages*, namely: Qualitative Research, Quantitative Research and Market Modelling. The geographical coverage, (aimed at the person mainly responsible for the purchase of meat for the household) and sample size pertaining to the various ethnical/cultural groups were randomly stratified (Vide Table 2.6).

**Table 2.6 Geographical coverage and sample size related to the various cultural groups  
(Market Research Africa, 1987)**

Cultural Group	Sample Size	Unit	% Coverage Represented	Living Area
Whites	1002	Household	88 %	URBAN
Blacks	997	Household	40 %	URBAN and TBVC
Coloureds	200	Household	32 %	CAPE TOWN
Asians	200	Household	55 %	DURBAN

For the White and Black cultural groups, area-stratified probability samples were drawn (stratified by province and within province by community) by using a computerised household census and taking every Nth dwelling. For the Asian and Coloured cultural groups, probability samples were drawn using the same computerised household census and taking every Nth dwelling. The Socio Monitor Value group consisted of Branded (27 %), Responsible (26 %), Innovative (23 %) and Self-Motivated (24 %) groupings. Thus, value grouping representing a balanced distribution.

The percentage of respondents that consumed (ate) beef, chicken and mutton *more than three times per week* were 31 %, 23 % and 16 % respectively. Only 1,4 % of the respondents consumed (ate) pork more than three times a week. However, the *value adding part* of pork was consumed significantly more. Bacon was consumed more than three times a week by 4,8 % of the respondents. Viennas, polony, russians and frankfurters was consumed by 13,6 % of the respondents more than three times a week. The combined or *aggregate consumption pattern of pork* (fresh and processed) *was a matter of concern*. 43,7 % of the respondents never ate bacon and 44,2 % of the respondents never ate pork! On the contrary 57,4 % of the respondents ate eggs more than three times a week. Pork chops were *perceived as being fatty* by 65 % of Black respondents, 52 % of White respondents and 40 % of Coloured respondents respectively.

#### **2.5.1.2.1 1987 - All Race Meat Usage and Attitude Study**

*Colour* was perceived as a good indicator of freshness for 68 % of the Black respondents and for 45 % of the other cultural groupings (Whites, Coloureds and Indians). However, 41,6 % of all respondents preferred pork chops with the least fat, 20,9 % preferred medium fat chops whilst 11,5 % preferred pork chops with the most fat!

The perceptions of the different types of meats across the three cultural groupings (Whites, Coloureds and Asians) can be summarised as follows:

- Although beef steak and lamb chops are the most expensive cuts, they are tasty and tender and preferred by adults.
- Chicken and fish (fresh as well as frozen) are seen as value for money. Strong images, relating to health such as low in cholesterol and non-fattening were portrayed.
- Mince is seen as good value for money, versatile to use and can be prepared almost instantly.
- The dominant attribute of pork chops (paradoxically however) was that they were perceived as fatty!

Amongst urban Blacks, pork has the advantage over other meats that it is cheaper and tasty.

### **2.5.1.3 The 1996 Market Survey**

During 1996 a quantitative meat survey was conducted by Market Research Africa (Market Research Africa, 1997) for the Meat Board, with the following objectives in mind:

- (i) To ascertain the relative position of SA Beef/Lamb/Mutton and New Fashioned Pork
- (ii) To ascertain whether the preceding advertising campaign had reached the target group effectively
- (iii) To determine the frequency of usage of the various meat types
- (iv) To determine the attitude, perceptions and relationships that consumers experienced with the various meat brands
- (v) To increase the market share of the above mentioned meat types in the future.

#### **2.5.1.3.1 Survey Coverage**

An area stratified probability sample, incorporating 2 513 households, was selected. The sample covered Whites and Blacks in urban areas as well as Coloureds and Indians in the major metropolitan areas. The survey (conducted by personal in-home interviews during April/May 1996 and October/November 1996) represented approximately 92 % of the urban adults and 53 % of the total adult population.

#### **2.5.1.3.2 Survey Findings**

In terms of the spontaneous awareness of meat protein, *pork had the lowest awareness score* with 13,5 % and *chicken the highest* with 44 %. The scores for Beef, Mutton and Lamb were intermediary and achieved awareness scores of 33,5 %, 20 % and 17 % respectively. The

spontaneous awareness score of fish was 42,5 % with eggs being the highest at 51,5 %. From this survey/experience it was concluded that chicken is the most consumed meat and pork the least! In terms of **meat purchase patterns**, 84 % of the respondents purchased through Super- or Hypermarkets, 47 % through Township butcheries, 43,5 % through traditional butcheries in other areas, 11 % of respondents through hawker/street vendors and 6,5 % through farmers.

#### **2.5.1.3.3 The Image of Brands**

From a total of 35 criteria, describing the image of brands of the various meat types, pork scored the lowest on 22 criteria, intermediate on 11 and highest in only two criteria, namely (i) fatness and (ii) not eaten by everyone in the household - but these were indeed negative reflections [Vide Addendum II: Image of Brands (relating to 35 meat quality criteria) Source: MRA, 1997)]! This phenomenon is an extraordinary matter of concern. The consumer in general perceived pork as a product with limited appeal, benefit, application and almost no justification.

#### **2.5.1.4 Consumer Reaction to Boar Taint**

In the MRA (1997) Multibus survey, 14 % of respondents (one out of every seven) indicated that New Fashion Pork smelled bad. With boar taint being a contentious issue, a research project, funded and requested by the Red Meat Research and Development Trust (RMRDT), consumer tests were undertaken in 1997/1998 at the University of Pretoria Campus, to determine consumer reactions to boar taint (De Kock, Van Heerden, Minnaar, Heinze, Potgieter & Anderson, 1998). Three hundred male and female pork eating consumers participated in the consumer tests.

The respondents (pork eating consumers) represented the three ethnic groups, namely Black, White and Coloured. One hundred and two boar carcasses were obtained from a commercial abattoir in Gauteng. These carcasses, containing specific concentrations of skatole and androstenone, (boar taint components) were used to ascertain consumer reactions towards different concentration levels. From this project, it became evident that:

- The mere androstenone and skatole concentrations did not fit a linear relationship with consumer preference.
- Skatole has a decided masking effect on androstenone
- Females are less willing to consume pork and pork products with detectable levels of boar taint.
- No significant differences between the black and white consumer groups in terms of their reaction to boar taint could be found.

- Finally, it appeared that the majority of consumers would be hesitant to consume pork that exhibits detectable levels of boar taint (skatole & androstenone).

#### 2.5.1.5 The 1998 Goat Commodity Market Survey

During 1998, a Market Study Report (Feasibility study on the commercialisation of indigenous goats in South Africa) was conducted by Eccles Associates, Inc. in conjunction with Positive Business Solutions for the Animal Nutrition and Animal Products Institute of the ARC (Market Survey Report, 1998). **Although the main objective of the survey was to ascertain perceptions, demands and responses of the goat commodity market, related commodities (other meat types including pork) were also researched**, not only from a benchmark point of view, but also to ascertain: (i) meat type awareness, (ii) meat type attractors and (iii) meat type repellors. The survey tested the response(s) of consumers as well as retailers. The total number of respondents interviewed (face to face, but in their homes) amounted to 450. Seventy eight percent (N=350) were consumer respondents and twenty two percent (N=100) were business (retail) respondents.

##### 2.5.1.5.1 Sample Demographics

Respondents were selected from the four main population groups, namely: Blacks (30,3 %), Asians (28,3 %), Whites (27,1 %) and Coloureds (14,3 %). 64 % of the sample respondents were female and 36 % were male. Respondents were proportionally interviewed in the major metropolitan areas of South Africa as follows: Cape Town (31,7 %), Johannesburg/Pretoria (30,6 %), Durban (21,1 %), Port Elizabeth (11,7 %) and Bloemfontein (4,9 %). Respondents fitted into LSM (Living Standards Measurements) 6,7 and 8 (the highest sophisticated segments).

##### 2.5.1.5.2 Survey Findings

From this study the well known meat types (beef, mutton and poultry) obtained the highest **awareness** scores (in excess of 92 %) followed by pork 74,6 % and fish 69,1 %. In terms of **behaviour**, poultry, mutton, fish and beef were respectively being used the most frequently, followed by pork and Chevon/goat meat. From this study the most important *pork attractors* (based on an index figure) were the following criteria:

- Widely available (33,4)
- Correct farming methods applied (26,3)
- Nutritious (24,6)
- What the family enjoys (20,6)

- Healthy colour (20,3)
- Juicy (19,7)

Negative aspects of pork (*pork repellors*) were criteria such as against people's religious beliefs (56,3 %), upsetting their stomachs (23,1 %) and the meat perishes quickly (22,9 %). The most negative repellant (being that of religion) could be attributed to the fact that Hindu, Islam, Muslim, Jewish and probably preconceived/conservative Christian respondents contributed to this surprisingly high negative figure.

*Poultry's endless list of positive attributes*, ranging from wide availability, versatility (good product differentiation), easiness to prepare to health attributes, value for money (in comparison to red meat and seafood), as well as sensory attributes, *renders it the meat of favour*. On the contrary poultry meat is the no. 1 competitor for all meat types. It was only against the religious beliefs of 2.9 % of the respondents! From this study and even more from a market/marketing and consumerism point of view, it became evident that **consumers want**:

- fresh products
- competitive prices
- clearly graded products
- products that are well packed and refrigerated
- sell-by dates (clearly marked)
- well packed/sealed meats

Consumers **do not want** unhygienic conditions and unhygienic meat, nor perished meat or bloody meat. **Thus, image of meat is of vital importance!** For stores that sell meat, freshness *per se* is viewed the single most important factor.

#### 2.5.1.6 The 2000 AC Nielsen/SAPPO Market Survey

During the period of February to June 2000, the company AC Nielsen MRA was requested by the South African Pork Producers Organisation (SAPPO) to conduct qualitative and quantitative market research regarding the red and white meat market, with specific reference to pork (Nielsen, 2000). The objectives of this study were to ascertain:

- i) Levels of awareness of New Fashion Pork<sup>5</sup>
- ii) Frequency of purchase and consumption patterns of meat
- iii) The perceptions/attitudes towards pork

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<sup>5</sup> New Fashion Pork (NFP) is a brand name that was established during the 1990's by SAPPO. NFP is light, lean, healthy and versatile. NFP also complies with the health criteria as stipulated by the Heart Foundation

- iv) The meat purchasing behaviour pattern
- v) Food purchase driving factors of the consumer.

A fundamental question, in order to improve the consumption of pork, was the following:

Which attributes of pork should be communicated and accentuated in order to change/alter or influence the consumer's decision? The demographics, sample size and **Multibus Methodology** can be summarised as follows:

**Table 2.7 Demographic breakdown of the respondents that were involved in the 2000 AC Nielsen Meat Multibus**

<b>RACE</b>	<ul style="list-style-type: none"> <li>• Black, Coloured, Indian &amp; White</li> </ul>
<b>INCOME CATEGORIES</b>	<ul style="list-style-type: none"> <li>• ≥R 8 000; R 4 000 - 7999; R 800 - R 3 999, up to R 799</li> </ul>
<b>AGE</b>	<ul style="list-style-type: none"> <li>• 16-24; 25-34; 35-49; 50+</li> </ul>
<b>HOME LANGUAGE</b>	<ul style="list-style-type: none"> <li>• Nguni (Zulu, Xhosa, Swazi, Ndebele)</li> <li>• Sotho (North, South, Tswana)</li> <li>• English (Including other European Languages)</li> <li>• Afrikaans (Including both English &amp; Afrikaans)</li> </ul>
<b>SEX</b>	<ul style="list-style-type: none"> <li>• Male, Female</li> </ul>
<b>PROVINCES</b>	<ul style="list-style-type: none"> <li>• Western Cape, Free State, Eastern Cape, North West and Northern Cape combined</li> <li>• Northern Province &amp; Mpumalanga combined</li> <li>• Gauteng &amp; Kwazulu-Natal combined</li> </ul>
<b>TV VIEWING</b>	<ul style="list-style-type: none"> <li>• Light (None to one hour per day)</li> <li>• Medium (1,5 to 2,5 hours per day)</li> <li>• Heavy (3 hours and more per day)</li> </ul>
<b>ACCESS TO TV</b>	<ul style="list-style-type: none"> <li>• TV in dwelling and set in hospital</li> </ul>
<b>COMMUNITY SIZE</b>	<ul style="list-style-type: none"> <li>• METRO'S, OTHER URBAN</li> </ul>
<b>MEAT TYPES EATEN</b>	<ul style="list-style-type: none"> <li>• BEEF, CHICKEN, FISH, LAMB, OSTRICH, PORK AND TURKEY</li> </ul>

Source: (Nielsen, 2000)

**2.5.1.6.1 Results and Survey Findings**

In terms of the aggregate meat consumption pattern, 98 % of all the respondents consumed chicken, 88 % beef, 84 % fish, 79 % lamb and 57 % pork. Chicken is the meat that was the most frequently eaten, purchased and served by all respondents ( $\geq 92\%$ ), followed by beef ( $\geq 80\%$ ), fish ( $\geq 60\%$ ), lamb ( $\geq 55\%$ ) and pork ( $\geq 40\%$ ).

The profile of South African pork consumers is the following: (i) Sixty percent of South African males and 53 % of South African females are consuming pork. (ii) Only 24 % of Indians consume pork, (iii) Fifty percent of Coloured and Blacks consumed pork (iv) Seventy eight percent of Whites consumed pork.

**Table 2.8 The profile of pork consumers based on age and language (Nielsen, 2000)**

<b>Age Category</b>	<b>Percentage Consumption per Category</b>	<b>Number of People Involved</b>
16 - 24	55	1889
25 - 34	55	2017
35 - 49	58	2175
$\geq 50$	59	1689
<b>Language</b>	<b>Percentage Consumption per Language Grouping</b>	<b>Number of People Involved</b>
Nguni	53	2462
Sotho	47	1736
English	53	1620
Afrikaans	71	1952

*From this study it became evident that pork consumption is closely related to income levels. In situations where income levels exceeded R8000 per month, 74 % of respondents consumed pork and where income levels were less than R800 per month, only 49 % of respondents consumed pork.*

Pork chops was mainly the cut of choice. Approximately 75 % of respondents consumed pork chops, followed by ribs (32 %) and roast (20 %). Per cultural grouping *the percentage pork chops*

*consumption* was 61 %, 62 %, 53 % and 90 % for Blacks, Coloureds, Indians and Whites respectively.

In terms of pork attractors, pork was popular amongst consumers due to taste (71 %), value for money (20 %) and tenderness (19 %). Brackets indicating the percentage expression of respondents/consumers. In contrast, 47 % of respondents disliked pork due to its high fat content. Fourteen percent of respondents indicated that it can make you sick, whilst 12 % of respondents indicated that pork deteriorates quickly in quality. The trend was the same across cultural and age groupings.

#### **2.5.1.6.2 Meat Purchasing Patterns: Present and Future Observations**

Fifty two percent of respondents purchased their meat from the typical butchery, whilst 34 % purchased from the supermarket. Consumers regarded the following attributes important when purchasing meat: Twenty nine percent of respondents indicated freshness as the most important attribute, 12 % rated inexpensiveness, 11 % taste and 10 % indicated the easiness to prepare. Sixty three percent indicated that chicken is the meat most frequently served, followed by beef (26 %), lamb (8 %) and pork ( $\pm$  2 %). Issanchou (1996) studied the effectiveness of labelling within an advertising campaign for pork. In this study, consumers indicated that they have more trust in the butcher and the keeping method (natural and pasture) than in a control label. **Given the findings of the recent study, it can be stated that the time has come for pork butcheries of excellence, receiving their products from slaughterhouses/processing plants of excellence, who in turn receive their pork from producers/breeders of excellence which comply with stringent quality, welfare and health criteria.**

An interesting consumption trend that was observed, was that approximately one third of respondents indicated that they are going to eat more white meat than red meat in the future. Meatless pizzas and vegetarian meals are becoming more important than the traditional meals, with a high meat content. From this study it *became evident that respondents/consumers view pork as a white meat*. Fifty nine percent of respondents view pork as a white meat and 31 % of respondents view pork as red meat. Sixty three percent of respondents regarded white meat to be healthier and 70 % of respondents were indeed aware of the heart foundation logo. Respondents in general had a good knowledge of the heart foundation logo. On the contrary less than half (42 %) of the respondents were aware of the New Fashion Pork Logo. This could be a matter of concern! Although the New Fashion Pork Logo is perceived as promoting pork that is healthy, modern, tasty and low in cholesterol, it's awareness levels are alarmingly low!

## 2.6 CONCLUSIONS TO CHAPTER II

Customization and consumerism, thus quality goods and services that satisfy the consumer completely and instantly, have become synonymous with the modern consumer. Although the marketing environment *per se* is subjected to continuous changes, consumers across the world show more and obvious similarities. They are very well informed, better educated, have higher levels of income, health conscious and want safe products and services accordingly. With approximately 50 % of respondents in the MRA 2000 market survey indicating that pork is too fat (compared to 53 % of respondents in 1970), this is an unenviable matter of concern. [This perception is also portrayed in The Netherlands (Hovenier, 1993), Scandinavian countries (Andersen, 1999) and Belgium (Verbeke *et al.*, 1999) where the consumer has a negative image of pork, because the product is perceived as being fat].

Modern consumers are consuming less red meat and more white meat, mainly due to the perception of better health, value and versatility related to white meats and fish. During 1970, beef was the most frequently served meat in South Africa (served by 93 % of respondents) followed by chicken (served by 83 % of respondents). By the year 2000, chicken was the most frequently served meat in South Africa (served by 92 % of respondents) followed by beef (served by 80 % of respondents). Cognizance should be taken of all pork's *attractors* (availability, taste, and value for money) and its *repellers* (religion, too fat, sickness-syndrome, boar taint and high perishableness) to eventually understand and satisfy consumer needs. **A concerted effort must be made to take the pig out of pork.** The question is how will it be achieved? The following table can make a valuable contribution (Vide Table 2.9).

Should pig breeders and producers embark on the high road of quality, striving to enhance market or *consumer orientated production*, attention should be given to physiological characteristics, such as PSE, pH, colour and intramuscular fat. Cognizance should be taken of the eating quality criteria *as preferred by consumers* relating to: wholesomeness, freshness, leanness, juiciness, tenderness, taste and nutritional value, which should originate/flow from effective consumer orientated production.

**Table 2.9 Short and long term solutions to minimize the consumer experienced pork repellors**

<b>REPELLOR</b>	<b>SHORT TERM SOLUTION</b>	<b>LONG TERM SOLUTION</b>
<ul style="list-style-type: none"> <li>• <b>Religion</b></li> </ul>	Don't fight the radicals, persuade the hesitants	Holistic understanding of the Bible
<ul style="list-style-type: none"> <li>• <b>Too fat</b></li> </ul>	Market at younger age, trimming of the carcass, ration alterations, improved management skills	Improved breeding / crossbreeding programmes, application of ultrasonic devices, marker assisted selection, etcetera
<ul style="list-style-type: none"> <li>• <b>Sickness syndrome</b></li> </ul>	Vacuum packed guaranteed products	Education, research, quality labelling
<ul style="list-style-type: none"> <li>• <b>Boar Taint</b></li> </ul>	Slaughter only gilts and barrows Chemical castration of males	On-line detection, marker assisted selection, "Guaranteed no boar taint pork" - product range
<ul style="list-style-type: none"> <li>• <b>High Perishableness</b></li> </ul>	Sell by dates and vacuum packing	Education, research, improved packaging methods
<ul style="list-style-type: none"> <li>• <b>Image of pork</b></li> </ul>	Aggressive and focused advertising	Youth Education* Continuous Promotion Consistent quality pursuit

\* To educate the youth, in primary and especially high schools, on the positive attributes of pork through factual and positive information campaigns

On the road to quality, producers must take the quality aspirations/perceptions of the consumer into account. In this regard the following traits warrant possible inclusion in the breeding objective:

- pH<sub>u</sub> - due to its favourable genetic correlations with most meat quality traits
- Colour - it affects the consumer's acceptance of pork
- IMF - it affects the juiciness, taste and tenderness of pork
- Tenderness - the most important organoleptic characteristic of meat.

Later on CHAPTER V will endeavour to structure aggregate breeding objectives for the South African pig industry taking the breeder, commercial producer, the processor, the consumer and the broader supply chain on board. In the next chapter (Chapter III) of this study the components of the South African pig industry or supply chain will be analyzed.