

## QUALITY SYSTEMS IN THE FRESH FRUIT EXPORT INDUSTRY

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### ABSTRACT

The fresh fruit export industry has traditionally relied heavily on end point inspection to achieve quality. In response to several changes in international markets and concerns over the inability of end point inspection to ensure product safety and quality, many codes of practice and quality standard have been developed specifically for the food industry. This article reviews the principles and practicalities of implementation of the standards which have achieved international recognition. Producers and packers face technical challenges integrating these systems into a holistic management system while this may also present a significant entry barrier for smaller producers who lack the resources and expertise.

### OPSOMMING

Die varsvrugteuitvoerbedryf maak tradisioneel gebruik van eindpuntinspeksie vir die handhawing van gehalte. Twyfel oor die doeltreffendheid van hierdie vorm van inspeksie ten opsigte van veiligheid en gehalte in die konteks van internasionale markte het tot gevolg gehad dat verskeie gebruikskodes vir die voedselbedryf tot stand gekom het. Die beginsels en praktiese implementering van hierdie standaarde wat internasionale erkenning geniet, word hierin behandel. Producente en verpakkers ondervind tegniese uitdagings oor hoe die standaarde in 'n holistiese bestuurstelsel geïntegreer kan word, gesien die problematiek van marktoetrede vir klein producente sonder kundigheid en voldoende bronne.

## **1. INTRODUCTION**

The global fresh fruit industry has for decades been regulated with most first world countries imposing product standards and phytosanitary requirements on the importation of food products, including fresh fruit. Enforcement of these standards has traditionally been through inspection and assessment procedures by government appointed agencies. Traditional end point inspection has played a central role in achieving quality.

The South African fruit industry has relied heavily on traditional inspection and testing procedures enforced mainly by the Perishable Products Export Control Board which is a Section 21 company appointed by the National Department of Agriculture to ensure compliance with minimum standards enforced in terms of the Agricultural Products Standards Act, 1990 (Act No. 119 of 1990).

To facilitate freer international trade in food products the World Trade Organisation (WTO) has published two agreements arising from Uruguay Round of Trade negotiations (1986 to 1993), namely the Agreement on Technical Barriers to Trade and the Agreement on the Application of Sanitary and Phytosanitary Measures (Sierra, 1999) which deal with the legal aspects of product quality that govern the ability of products to access international markets.

This and other factors facilitating the globalisation of the food trade has focused attention on strengthening measures to ensure the quality and safety of imported foods. Traditional sampling and analysis programmes are no longer considered adequate to provide the level of protection required by many countries.

Many suppliers and industry organisations are also realizing that compliance with minimum standards does not necessarily imply compliance with customer or consumer requirements.

Until recently many of the principles embodied in total quality management (TQM), which are common practice in many industries, had not been readily adopted in the fruit industry and in agriculture in general. This article highlights the importance of the implementation of quality management in fruit production and packing and explores recent developments in terms of suitable alternatives, which have become available.

This article does not specifically address the handling and preservation of products during storage and transportation to international markets, although it is recognized that these are important elements of quality management in the total supply chain.

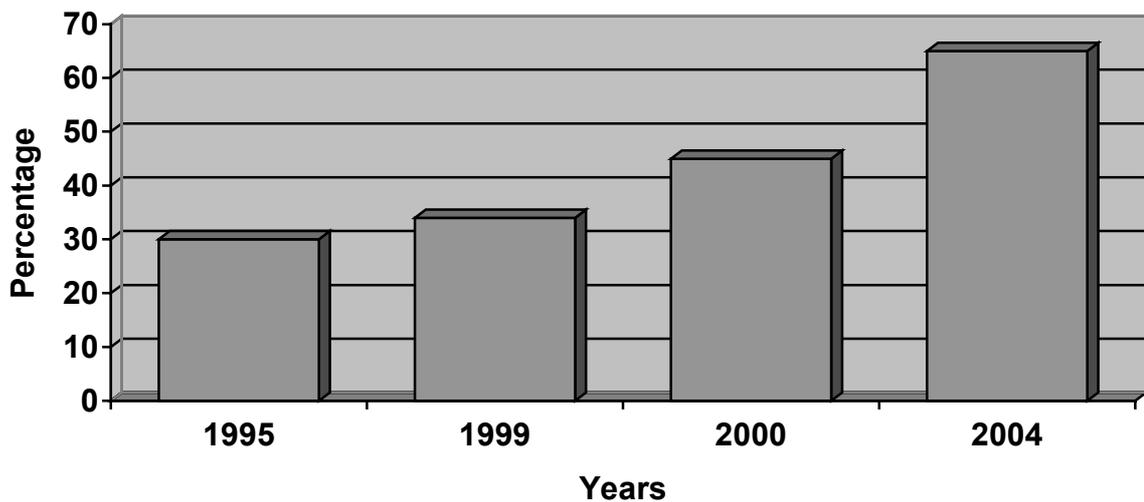
## **2. THE FRESH FRUIT EXPORT MARKET**

Before discussing quality systems in detail one may consider the changes currently affecting the South African fruit export industry that are driving the need for improvements in product and service quality and the resultant trends in international customer and consumer needs for quality food products.

Over the past 12 months there have been numerous press reports covering the financial difficulties faced by many fruit producers in South Africa as they come to grips with the globalisation of the industry and hyper-competition (Kahn, 2001: [1]).

The main underlying causes are:

- (1) Increasing concentration of retailer buying power in traditional export markets. Figure 1 shows the trend in revenue growth of the top 10 global retailers expressed as a percentage of the top 100 retailers (Dun and Bradstreet, 2001: [2] ). The figure for 2004 represents an estimate based on the current trend.



**Figure 1: Revenues of the top ten global retailers expressed as a percentage of the revenues of the top 100 retailers**

This has resulted in a shift in the balance of power towards the global retailers, placing them in a strong position to demand compliance with product specifications and process requirements aimed at achieving a competitive advantage. Pressure for improvement has also come from legislation in certain countries such as the Food Safety Act of 1990 in the United Kingdom which requires retail organisations to take precautions and to exercise due diligence in avoiding the failure of food products.

- (2) Increasing worldwide fruit production leading to market over-supply especially in major commodities produced in both the Northern and Southern Hemispheres (SHAFPE, 2000). In the major fruit markets populations and economies are mature.
- (3) Heightened awareness of food safety issues following the plethora of media reports of food-borne illness outbreaks and pathogens such as Anthrax, foot and mouth disease and mad cow disease.
- (4) The deregulation of deciduous and citrus exports from South Africa in September 1997. These products account for approximately 90% of the volume of fresh fruit exported from South Africa. Prior to deregulation these industries competed as monopolies and were essentially supply driven. With deregulation the industries have become fragmented (currently approximately 330 active exporters) and have had to adapt to a market driven approach.

Associated with these trends are changes in the needs and requirements of both customers and consumers, especially in developed countries. A study performed in Australia by Small et al (1995): [3] found that the top four considerations in determining a quality food product are nutritional value, cleanliness in the growing environment, cleanliness in the production process and value for money.

According to Surak (1999): [4] the primary drivers in North American consumers' food purchasing or repurchasing decisions are that it be convenient to use and of high quality, and be fresh tasting. The consumer also expects the food to be nutritious and safe to eat. Consumers will not pay a premium for food that is safe to eat. It is their right to expect it!

In September 2000 a report entitled "European Policy on Food Safety" written for the European Parliament (Millstone et al, 2000: [5] ) assesses concerns regarding food safety, quality standards and public health policy-making. This highlighted the concerns over inability of end point inspection to ensure product quality, and a decline in confidence of consumers in the safety of food.

Supplier management systems must therefore address all of these issues in a holistic, integrated and cost effective manner. This will require careful selection of concepts and frameworks within which to develop management systems.

### **3. QUALITY SYSTEMS IN THE FRESH PRODUCE INDUSTRY**

Producers and packers face a daunting task of selecting and implementing the most suitable options or combinations thereof to survive and prosper in the international fruit export Industry.

There are several quality systems and combinations thereof that have received international recognition in the fresh fruit export industry:

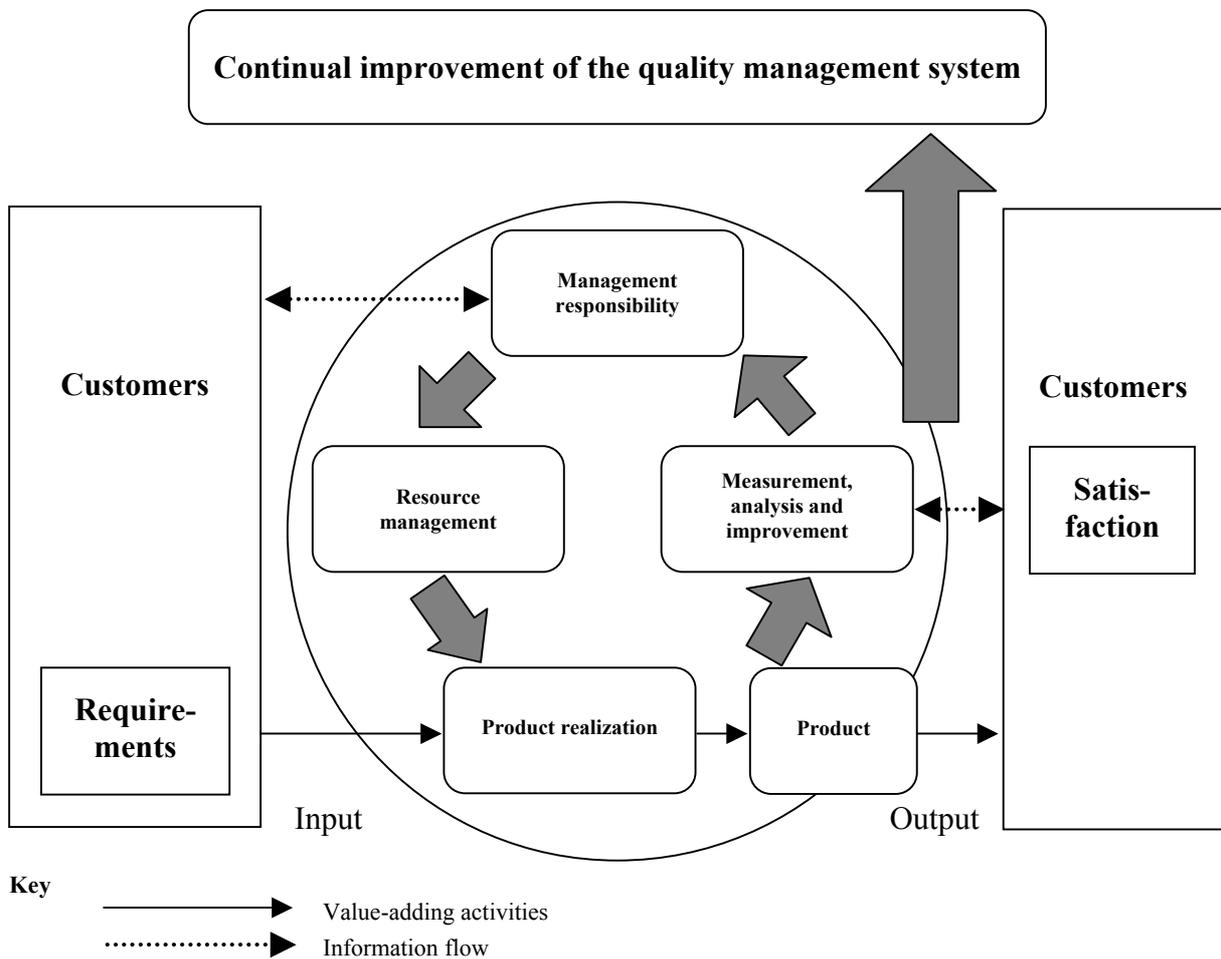
- ISO 9000 Quality Standards: [11; 12] and ISO 14000 Environmental Management: [13].
- Hazard Analysis Critical Control Point (HACCP) System: [6].
- British Retail Consortium Technical Standard for Companies Supplying Retailer Branded Food Products: [7].
- European Food Safety Inspection Service Standard for Companies Supplying Food Products: [8].
- SQF 2000<sup>CM</sup> (Safe Quality Food) Quality Code developed by Agriculture Western Australia: [9].
- EUREPGAP Protocol for Fresh Fruits and Vegetables: [10].
- Retailer and Produce Marketing Organisation Codes of Practice.

Before evaluating the suitability and practicalities of implementation of these systems in the fresh fruit industry, the background and principles embodied in each system are reviewed.

### 3.1 ISO 9000 Quality Standards: [11; 12] and ISO 14000 Environmental Management System: [13]

The International Organisation for Standards (ISO) is a worldwide federation of national standards bodies (represented by the SABS in South Africa) and is based in Geneva, Switzerland. The ISO 9000 standards define quality management requirements that can be used for internal application by organisations, or for certification, or for contractual purposes. They focus on the effectiveness of the quality management system in meeting customer requirements.

Figure 2, reproduced from the ISO 9001:2000 Code of Practice, provides a process-based view of the quality management system. The process approach facilitates an organisation's ability to identify and understand its activities and their interdependencies. This enables an organisation to define and control these activities.



**Figure 2: Model of a Process Based Quality Management System**  
 (Source: SABS ISO 9001: 2000 Code of Practice: Quality Management System – Requirements)

The ISO quality standards incorporate the following eight quality management principles:

- Customer focused organisation
- Leadership

- Involvement of people
- Process approach
- System approach to management
- Continual improvement
- Factual approach to decision making
- Mutually beneficial supplier relationships

The ISO 14000 standard provides an international standard for environmental management systems so that organisations will have a systematic framework for their environmental activities. It focuses heavily on strategic issues such as setting goals and objectives and developing policies, while ISO 9000 focuses on specific businesses processes. ISO 14000 required compliance with four organisational areas (Raiborn et al, 1999: [13] ):

- Implementation of an environmental management system.
- Assurance that procedures are in place to maintain compliance with laws and regulations.
- Commitment to continual improvement.
- Commitment to waste minimization and prevention of pollution.

While these standards are applicable to any organisation supplying food products they do not provide specific guidelines or criteria for the fresh fruit industry. With the exception of the largest organisations in the South African fruit export industry, ISO has not been adopted widely for possibly the following reasons:

- Resource requirements for implementation exceed availability in most smaller organisations.
- Level of management and employee skills required to implement the system.
- ISO standards do not adequately address food safety issues.
- The ISO quality management system is perceived as being too cumbersome for small organisations.

Many of the elements contained in ISO standards have however been incorporated into tailor-made systems for the food industry. These are discussed below:

### **3.2 Hazard Analysis Critical Control Point (HACCP)**

The HACCP system for managing food safety concerns grew from two major developments. The first breakthrough was associated with W.E. Deming whose theories of quality management are widely regarded as a major factor in turning around the quality of Japanese products in the 1950's (Gitlow, Oppenheim & Oppenheim, 1995: [14] ). Deming and others developed total quality management (TQM) systems that emphasized a total systems approach to manufacturing that could improve quality while lowering costs.

The second major breakthrough was the development of the HACCP concept in the United States of America in the 1960's by Pillsbury Company, the United States Army and the United States National Aeronautics and Space Administration (NASA) as a collaborative develop-

ment for the production of safe foods for the United States space programme. This system incorporated several of Deming's quality management concepts.

Food industry attention to HACCP principles generally remained insignificant until they were endorsed in the 1980's by the World Trade Organisation (WTO), the Food and Agriculture Organisation (FAO) of the United Nations and the United States National Advisory Committee on Microbiological Criteria for Foods (NACMCF) (Ropkins and Beck, 2000: [15] ).

Recognizing the importance of HACCP to food control, the WTO's Codex Alimentarius Commission (CAC) adopted a document in 1993 entitled "Guidelines for the Application of the Hazard Analysis Critical Control Point (HACCP) System" (ALINORM 93/13A). HACCP has since become widely promoted as the most suitable concept for achieving food safety in the food industry. Given the international concerns over food safety, implementation of one or other HACCP based system is fast becoming a requirement for export of processed foods to international markets.

The HACCP concept is a systematic preventive approach to the identification, assessment and management of risk relating to biological, chemical and physical hazards of food production and processing. HACCP focuses on preventive measures rather than mainly relying on end point testing. The HACCP concept is based on the following seven steps or principles:

- Conduct hazard analysis, considering all ingredients, processing steps, handling procedures and other activities involved in a foodstuff's production.
- Identify critical control points (CCP's).
- Define critical limits for ensuring the control of each CCP.
- Establish monitoring procedures to determine whether critical limits have been exceeded and define procedures for maintaining control.
- Establish corrective actions to be taken if control is lost (i.e. if monitoring indicates that critical limits have been exceeded).
- Establish effective documentation and record keeping procedures for the development of HACCP procedure.
- Establish verification procedures for routinely assessing the effectiveness of the HACCP procedure once implemented.

The application of HACCP requires a foundation of prerequisite programmes operating according to good manufacturing practices (GMP's) and good agricultural practices (GAP's) to be in place prior to the adoption of HACCP. The ability of an industry or sector to support or implement the HACCP system therefore also depends on the degree of its adherence to these practices. No explicit criterion has been developed to determine when a control measure should be managed under a prerequisite programme or elevated to the HACCP system.

The HACCP system is compatible with the implementation of TQM systems such as ISO 9000 and can be applied throughout the food chain from primary producer to the consumer.

Governments across the world are increasingly adopting mandatory HACCP based regulations as the best system to ensure safety of foods. In Europe this was emphasized by the European Union Council Directive 93/43 (1993) on the hygiene of foodstuffs that states that food business operators shall identify any steps in their activities critical to ensuring that adequate

procedures are identified, implemented, maintained and reviewed on the basis of HACCP principles (Lupin, 1999: [16] ). Within the USA (Kvenberg, 2000: [17] ), the Food and Drug Administration (FDA) of the United States has mandated HACCP for seafoods and is proposing mandating HACCP for facilities producing fruit and vegetable juices (FDA, 1998).

As far as fresh produce is concerned there is as yet no legislation mandating compliance with HACCP. While implementation is therefore voluntary it is predicted that it is a matter of two to five years before third party certification to HACCP systems will be formally applied as a supplier selection criterion by several of the most discerning global retailers.

### **3.3 British Retail Consortium Technical Standard**

Under the terms of the UK Food Safety Act 1990, retailers have an obligation to take all reasonable precautions and exercise diligence in the avoidance of failure, whether in the development, manufacture, distribution, advertising or sale of food products to the consumer. Until recently each retailer had responded to this legal requirement through the in-house development of Codes of Practice for implementation by suppliers.

The British Retail Consortium (BRC) Technical Standard for Companies Supplying Retail Branded Food Products was developed by the BRC Technical Standards Committee and was published in 1998 (British Retail Consortium, 1998: [7] ) to assist retailers in the fulfilment of legal obligations and protection of the consumer. The standard provides a common basis for the inspection of companies supplying retailer branded food products and is intended to be incorporated into standards used by third party inspection bodies. While this standard is specifically intended for retailer branded products it can be applied to any food production organisation. The standard requires:

- the adoption of HACCP;
- a documented quality management system; and
- control of factory environment standards, product, process and personnel.

The main elements contained in the standard include:

- The HACCP system as per the guidelines published by the Codex Alimentarius Commission.
- Quality management system which incorporates several elements similar to ISO 9000 such as quality policy statement, document control, procedures, internal audit, corrective action and traceability.
- Factory environment standards, which include elements such as site location, construction and layout, equipment, maintenance, housekeeping and hygiene.
- Product control including product design, product packaging, product analysis, product release and control of non-conforming product.
- Process control including time/temperature control, quality control, equipment and process validation and calibration.
- Personnel including personal hygiene, medical screening, protective clothing and training.

The standard provides for a certificate of inspection to be awarded at one of two levels: Foundation Level and Higher Level. To achieve accreditation to the standard, inspections must be carried out by bodies formally accredited to the European Standard EN 45004 (General Criteria for the Operation of Various Types of Bodies Performing Inspection).

The BRC has also published an inspection protocol which provides specific requirements to those organisations involved with inspection or audit against the abovementioned standard. Only those inspection bodies that are accredited to EN 45004 are authorised to carry out inspections against the BRC standard. This therefore may have cost implications for South African producers since there are few such organisations in South Africa.

### **3.4 European Food Safety Inspection Service Standard**

The European Food Safety Inspection Service (EFSA) Standard for companies supplying food products includes all the requirements of the British Retail Consortium standard with the exception that the EFSA Standard includes requirements for technical support and shelf life testing of products (EFSA, 1998).

This standard is very similar to the BRC Standard.

### **3.5 SQF 2000<sup>CM</sup> (Safe Quality Food) Quality Code**

Early studies by the Australian Quarantine Inspection Service (AQIS) indicated that conventional certification systems, such as ISO 9000, were likely to be too cumbersome for use with HACCP, especially for small and medium sized horticultural enterprises. ISO 9000 was also not perceived as a meaningful criterion for assessing food safety. So the West Australian Department of Agriculture's Trade and Development Unit instigated the Safe Quality Food (or SQF) 2000<sup>TM</sup> Quality Code: [9].

The code, which is supported by a comprehensive training manual, employs simple consumer based principles (Peters, 1998: [18]).

- To meet consumer expectations, appropriate food product specifications have to be developed for the assessment of both quality and safety.
- The safety assurance scheme should enable these specifications to be assessed during production.
- A flowchart should be produced for the specific food production enterprise.
- The safety assurance scheme should be developed in accordance with CAC.
- The safety assurance scheme should incorporate support programmes for good manufacturing practices.
- The process and safety assurance scheme should be assessed and certified by independent third-party audit and certification.

The SQF Quality Code comprises the following major elements:

- Commitment including the need for a quality policy, quality manual, organisation structure and training.

- Specifications for goods and services purchased from suppliers and for finished products.
- Control of production.
- Verification including calibration of equipment and quality system review.
- Document control and records.
- Product identification and traceability.

Ropkins and Beck (2000: [15] ) in an evaluation of worldwide approaches to the use of HACCP found that the SQF system was the most practical and readily applicable approach to HACCP and that it was rapidly gaining acceptance both in Australia and other countries. Peters (1998: [18] ) attributes this success to a number of factors including:

- Focus on consumer requirements when identifying quality and safety factors and developing subsequent assessment criteria.
- A voluntary rather than mandatory requirement for certification, whilst at the same time maintaining a strict adherence to legislative requirements.
- A clear business enhancement potential from competitor differentiation.
- Requirement for assured supply chains from primary producer, through all steps of production to the purchaser.

### **3.6 EUREPGAP Protocol for Fresh Fruits and Vegetables**

In response to increasing consumer interest on the impact of agriculture on food safety and the environment, the Euro Retailer Group (EUREP) decided to promote good agricultural practice (GAP) standards in horticulture. The EUREPGAP protocol for fresh fruits and vegetables (first revision published in 1999: [10] ) sets out a framework for good agricultural practice (GAP), which defines essential elements and developing best practice for the production of global horticultural products. It defines minimum standards acceptable to the leading retail groups in Europe (EUREPGAP, 2001). EUREPGAP is a global pre-farm gate standard agreed among all partners in the food chain.

EUREPGAP is administered by Foodplus GmbH, a private, non-profit organisation based in Cologne, Germany. Participation in EUREPGAP is voluntary and based on objective criteria. Participating growers should be able to demonstrate their commitment to:

- Maintaining confidence in food quality and safety.
- Minimizing detrimental impact on the environment, whilst conserving nature and wildlife.
- Reducing use of agrochemicals through adoption of Integrated Production Systems.
- Improving efficiency of use of natural resources such as soil, water, air and energy.
- Ensuring a responsible attitude to worker health and safety, welfare and training.

The main elements contained in the protocol are:

- Record keeping
- Varieties and rootstocks
- Site history and site management

- Soil and substrate management
- Fertiliser usage
- Irrigation
- Crop protection
- Harvesting
- Post-harvest treatments
- Waste and pollution management
- Worker health, safety and welfare
- Environmental issues
- Complaint procedures

There are three options under which producers can achieve EUREPGAP certification, namely:

- Option 1: Individual grower certification.
- Option 2: Producer marketing organisation model, i.e. organisations that sell fresh produce to retailers.
- Option 3: Benchmarking of an existing scheme.

Certifying bodies need to be accredited under ISO 65 / EN 45011 (certification of products and production processes) and must apply to EUREPGAP for recognition.

### **3.7 Retailer and Produce Marketing Organisation Codes of Practice**

According to Handfield, Monczka and Trent (1999: [19] ) there are several important reasons why an organisation should take an active interest in the quality performance of its suppliers:

- Supplier impact on total quality. The quality expert Philip Crosby estimates that suppliers are responsible for 50% of a firm's product quality related problems.
- Current supplier performance levels. Given the level of competition being experienced in the global economy it is a certainty that longer-term competitiveness will require a much higher performance level from suppliers.
- Continuous improvement requirements. Companies must improve continuously to remain competitive over time. One way to do this is through effective management of supplier quality.

To address these needs many of the larger retailers and produce marketing organisations developed codes of practice during the early and mid 1990's. These served as a foundation from which abovementioned standards such as BRC, EFSIS and EUREPGAP have been developed. Examples of such codes of practices include:

- Tesco – Recommended Operating Standards for Fresh Produce Suppliers, 1995.
- Sainsbury's Product Management System for Suppliers of Own-Branded Products, 1996.
- Sainsbury's Policy on the Integrated Crop Management System for Environmentally Responsible Crop Production.

- New Zealand Apple and Pear Marketing Board Code of Practice for Pipfruit Production and Packing 1991.
- Capespan Integrated Crop Management Accreditation System, 1998.
- Fyffes Due Diligence Package for Suppliers, 1997.

The standardisation of quality systems is likely to result in retailers and produce marketing organisations increasingly recognizing and insisting on third party certification to international standards. It is therefore likely that these will be simplified and will refer to international standards. It should however be recognized that these organisations have played a key role in promoting the adoption of quality systems and will probably continue to do so to satisfy customer and consumer needs. However, it is the process owner's responsibility to implement these systems and to carry the costs thereof.

Fragmentation and dynamics of the South African fruit export industry is also likely to favour adoption of international standards over produce marketing organisation codes since producers will want to maintain flexibility while retaining access to the most lucrative markets.

Certification under produce marketing organisation codes of practice is likely to be perceived as undermining flexibility unless these organisations can provide cost and management benefits to producers and packers. For example, Option 3 of the EUREPGAP code, which makes provision for benchmarking and certification of schemes developed by other organisations, has the potential to reduce inspection and certification costs for the grower. This is due to the lower cost of internal inspection permitted under Option 3 compared with third party audits required under Option 1. Limited availability of qualified, approved auditors in third world countries including South Africa is likely to place a premium on inspection costs.

#### **4. CONCLUSIONS**

This review demonstrates that there is now widespread promotion of quality management principles in the fresh fruit export industry by both government and industry representative bodies, and that international standardisation of systems is developing rapidly. While this article does not explore the levels of commitment and adoption of these systems in South Africa, it does form the basis for a field study of this topic.

There exists a lack of clarity on how these different systems should be integrated into the overall quality system of the organisation. For example, HACCP on its own does not adequately address product quality assurance needs. This is one of the areas where many South African fruit producers may resist implementation since attempts to implement HACCP in the absence of prerequisite GMP's and GAP's are not likely to contribute directly to business success. As already mentioned, consumers are not prepared to pay a premium for safe food.

Confusion can develop over integrating HACCP and EUREPGAP with pre-existing quality systems such as ISO 9000 since on a practical basis it is difficult and may seem illogical to separate controls that address food hazards from controls that address quality, environmental or social factors. A firm's system of controls to assure safety are in many respects identical to systems that assure quality and other requirements. Consequently many producers may find it challenging to separate safety hazards that should be controlled as Critical Control Points from other processes or risk areas that should be controlled in other ways. One should how-

ever recognize the importance of separating food safety from quality and other controls and that HACCP needs to be a separate subsystem of the overall quality assurance system.

To simultaneously implement HACCP and EUREPGAP, both of which require foundation quality systems, may also be overwhelming, especially for small growers who lack the resources, skills and time. This may present a barrier to future entry of first world international markets.

The SQF 2000<sup>TM</sup> system represents a practical solution to some of the above difficulties in that it combines food safety and quality into a simple yet effective process. This is especially true for smaller enterprises that lack the expertise and resources to implement the more comprehensive systems such as ISO 9000.

While there is as yet no mandatory legislation requiring compliance with any of the above-mentioned systems, retail customers are placing pressure on suppliers and are likely to use third party certification to either the BRC or EFSIS and EUREPGAP standards as selection criteria. Suppliers will in any event in future be closely monitored by their customers. The consumer wants safe foods that are of good quality and are provided at a low cost, and with minimal impact on the environment.

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