

Impacts of quality standards on food chains; comparison of three regions

Jacques H. Trienekens
Wageningen University
Social Sciences Department
Hollandseweg 1
6706 KN Wageningen
The Netherlands
E-mail Jacques.Trienekens@wur.nl

Abstract

A large diversity of food quality and safety standards, both public and private, now exists in western countries. For developing country producers this variety of standards makes demands from western customers highly in-transparent, making it very difficult for these parties to develop trade relationships with western customers and even more difficult to take dynamic positions in supply networks because standards and related demands might change from transaction to transaction. The paper describes major differences in food quality and safety standards that are implemented by producers, processing companies and distribution companies in EU, Mercosur and ACP (African, Caribbean, Pacific) countries and discusses trends, bottlenecks and opportunities in food chain development in these three regions, based on studies in 12 countries.

Key words: Food quality and safety, standards, food chains, developing countries

1. Introduction

The autonomy and independence of international food supply chains is shifting toward interconnected systems with a large variety of complex relationships (Trienekens and Omta, 2002). Changes in sourcing, production and marketing as a result of the increased globalisation of trade of food lead to exposure to new risks and greater potential consequences of food-borne illness outbreaks. During the last decade, concerns about food quality and food safety have been raised among consumers. Several sector-wide crises, like the BSE crisis, dioxin crisis, classical swine fever and hoof and mouth disease in Europe have fuelled these concerns. Consumers in industrialised countries have become more aware of potential food hazards through greater media coverage (Opara and Mazaud, 2001; Unnevehr, 2000). National and international regulations and legislation in the area of quality and safety of food are set up by national and international regulatory agencies. For example the European Union has introduced the General Food Law in January 2005. Food quality and food safety has also become an integral element of the business strategy of most retailers and other parties in the food chains.

These developments indicate that business strategies must now pay attention not only to traditional economical and technological aspects, but also to topics like the safety, healthfulness, taste, nutritional benefits and freshness of food products (Opara and Mazaud, 2001). Furthermore, new tight partnerships with other parties become important for all

businesses to achieve safe and high quality food for the consumer. Obviously, these developments will change the position and role of all parties and other stakeholders in international food supply chains.

Developing countries are becoming more and more integrated in the global food market due to the increase of consumer demand in Western countries for year round supply of exotic products and global sourcing of Western retailers and food industries. This means, however, that developing countries must adapt to the stringent quality and safety standards and regulations in these markets. They must also gain better control over production, trade and distribution of agricultural products in order to guarantee traceability of their products and to operate in a cost-effective way so as to compete on the global market. One important barrier for developing country producers in this respect is the lack of an enabling environment (institutional and infrastructure facilities). For example, many countries lack skilled people and laboratory facilities, which makes good quality control difficult.

This paper reports results of an EU financed concerted action (Safe and High Quality International Food Chains) in which universities, research institutes and governmental organizations from six EU, three Latin American and three ACP (African, Caribbean, Pacific) countries participated: Netherlands, Denmark, United Kingdom, Portugal, Hungary, Argentina, Uruguay, Trinidad and Tobago, Kenya, Uganda. In these countries studies have been performed of quality standards and chain quality systems in three product groups: beef, fruit, fish. Besides these studies, also trends, bottlenecks and opportunities in international chains from the three regions have been identified.

2. Quality and safety standards

Companies around the world are increasingly using quality assurance systems to improve their product and production processes. At the same time there is a move from the old end-of-line product inspection approach to a new environment of a quality assurance approach where the links in the food chain assume responsibility for safety through control of their processes. This means that quality assurance is required at each step in the food production chain to ensure safe food and to show compliance with regulatory and customer requirements. Legislation at global (i.e. Codex Alimentarius), international (e.g. EU) and national levels provides the basic framework and policy guidance for the most common quality assurance systems.

Since the 90ties there has been an enormous increase in public and private food standards. Giovannucci & Reardon, 2001 define standards as “defined parameters that segregate similar products into categories and describe them with consistent terminology that can be commonly understood by market participants”, thereby improving the efficiency of markets. Standards may concern any of the processes in the food chain, from farm to fork. In this article we discuss food standards in a broad sense, including social and environmental considerations, and their application by various parties in the food chain.

2.1 Generic food quality and safety standards

The three most important generic quality assurance systems in the food sector are Good Agricultural Practices (GAP), Hazard Analysis of Critical Control Points (HACCP) and International Standard Organization (ISO).

GAP systems include a set of guideline for agricultural practices aiming at assuring minimum standards for production and storage. Important topics are pest management (optimal use of pesticides), manure handling, maintenance of water quality, worker and field sanitation, guidelines for post-harvest handling and transportation, among others. In the last years increasing attention is given to managerial aspects like documentation, complaint and recall procedures, labelling, etc.

HACCP (Hazard Analysis of Critical Control Points) is a systematic approach to the identification, evaluation and control of those steps in food manufacturing that are critical to product safety. Currently HACCP principles are the basis of most food quality and safety assurance systems (Codex Alimentarius, EU and US food legislation, most private standards). HACCP identifies risks in the production processes that can lead to unsafe products, and designs measurements to reduce these risks to acceptable levels. HACCP aims at control of hazards in stead of end-of-pipe inspection. It is basically designed for application in all links of the food chain, ranging from growing, harvesting, processing, distribution and retail to preparing food for consumption. HACCP involves seven principles:

- Analyze hazards (biological, chemical, or physical);
- Identify critical control points. These are points in a food's production at which the potential hazard can be controlled or eliminated;
- Establish preventive measures with critical limits for each control point;
- Establish procedures to monitor the critical control points;
- Establish corrective actions to be taken when monitoring shows that a critical limit has not been met;
- Establish procedures to verify that the system is working properly;
- Establish effective recordkeeping to document the HACCP system.

There are some important pre-requisites for HACCP implementation, such as sanitary design principles (e.g. linear product flow), Good Manufacturing Practices and safety programs, written specifications for all ingredients, products and packaging materials, sanitary design principles and maintenance schedules, personal hygiene requirements, documented procedures to assure segregation and proper use of non-food chemicals, traceability and recall procedures, etc.

ISO (International Standard Organization) standards. The essence of an ISO-based quality system is that all activities and handling must be established in procedures, which must be followed by ensuring clear assignment of responsibilities and authorities. Whilst GAP and HACCP pay attention to both technological and management issues, ISO focuses on management. Most used of all ISO standards is the ISO 9000 series for quality. The standards are independent of any specific industry. It includes typical elements of quality management such as inspection tasks and responsibilities and also pays attention to economic aspects of quality assurances. Recently ISO 22000 has been launched as a new standard covering the whole food supply chain and including attention to HACCP and GAP requirements.

2.2 Private food safety and quality standards

Since the 1990ties many private food quality and safety standards have been developed.

Major aims of private food safety standards (Vellema and Boselie, 2003):

- to improve supplier standards and consistency, and avoid product failure;
- to eliminate multiple audit of food suppliers- manufacturers through certification of their processes;
- to support consumer and retailer objectives by “translating” these demands through the chain;

- to provide concise information to assist with a due diligence defence in case of food incidents

Private food safety and quality standards are best represented by three examples: Eurep-gap, British Retail Consortium and SQF (Safe Quality Food).

Eurep Gap.

Eurep is an organization of more than 20 large European retailers and purchase organizations (e.g. AHOLD, TESCO). It is a package of norms aiming to guarantee environment-friendly, safe and high-quality products. Eurep Gap pays major attention to food safety, human resource management and environmental measurements and aims at primary producers. The Eurep Gap certificate is developed to make business processes transparent. The norms of the Eurep-gap retailers are more rigid than (EU) governmental demands. A disadvantage of Eurep Gap is that it takes the legislation of the country where it is implemented as a starting point. This explains why Eurep Gap implementations can differ from country to country.

BRC (British Retail Consortium).

In 1998 the British Retail Consortium, with participants such as TESCO and Sainsbury, has defined common criteria for the inspection of food processing and distribution companies (Eurep-Gap focuses on producers). Before BRC was introduced retailers carried out inspections separately; joint inspections, however, reduce costs. Retailers in other European countries now also demand from their suppliers for inspections according to BRC rules. The norms of the British Retail Consortium are converging with HACCP norms, although more attention is paid to factory environment and production facilities.

SQF (Safe Quality Food).

SQF aims at quality assurance in supply chains. Its basis are the HACCP norms and the ISO-9000 series norms. SQF distinguishes between two norms. SQF 1000 focuses on primary producers, all other companies are certified according SQF 2000. An important difference between both norms is that SQF 2000-companies must work according HACCP. SQF is developed in Australia and is internationally well accepted. An advantage of SQF is that it can be included on the product label.

Apart from these examples there are hundreds of other private quality and safety standards in EU. Various types of standards can be distinguished:

- Certification systems for sustainable agriculture. These systems focus on environmental friendly production and the use of specific quality standards. Examples of such systems are “EKO” in The Netherlands and “CRAE” in Spain.
- Sector-based (often on national level) quality assurance systems. These systems aim at control of primary production in certain agri-sectors. They aim at safe and healthy food products. Examples are the “Farm Assured British Beef and Lamb” (FABBL) and “Integraal Keten Beheer” (IKB, ‘Chain management’ in English) in The Netherlands. To give an example of such a system, typical elements of IKB are: use of growth hormones, Good Manufacturer Practices (GMP) at trader and transport company, GMP + feed required (salmonella free), medicine use (control by veterinary), hygiene control, animal friendliness, HACCP obliged for slaughterers and meat processors
- Quality assurance systems initiated by food industries. These are managed by national or international food industries that aim for specific and distinct processes (e.g. SAI: Sustainable Agriculture Initiative).

- Retailer systems. These systems are controlled by retailers. Most of these systems aim at sustainable and safe production. Important examples as Eurep-Gap and BRC are already described.
- Regional or traditional quality assurance systems. This category includes all initiatives that refer to regional or local production and have implemented their own standards. An example in the Netherlands is “Nautilus”, EKO products from a region in The Netherlands.

In general, systems initiated by retailers cover the largest part of the chain. Until recently most quality assurance systems did not include traceability, covering the food chain. Produce and half-fabricates can be traced at chain-link level separately, however without giving a fork-to-farm overview. Risks so far, are tackled through separate supplier audits and through monitor programs. An exception is found in meat chains in countries where, as an effect of recent events, much attention is given to traceability issues. In these chains integrated chain-wide traceability systems exist.

The proliferation of quality standards described above has lead to increasing concerns of parties in the food chain about costs of implementation (and certification) and accessibility of markets governed by the multitude of these systems. A large group of internationally operating retailers has taken the Global Food Safety Initiative (GFSI) that aims at harmonization of existing standards so as to arrive at uniform norms, instead of the current way where countries and companies define their own standards (www.ciesnet.com/global_food/main.html). The expectation is that private (retail) standards like Eurep-GAP and BRC will be more and more harmonized with other private standards. These will reflect a second layer of demands put on food companies above legal obligations like Codex Alimentarius and the use of HACCP in industrialized countries. However, above these private “compulsory” systems layer, another layer of standards with even more specific demands has evolved. Examples of these “top-layer” standards are Tesco’s “Nature’s Choice” which puts a number of environmental demands on top of Eurep-GAP demands, EKO labels and Fair-Trade labels. In this perspective it is expected that proliferation of standards will continue, only on a different level as was the case so far.

Figure 1 depicts this three layer-model for quality system standards.

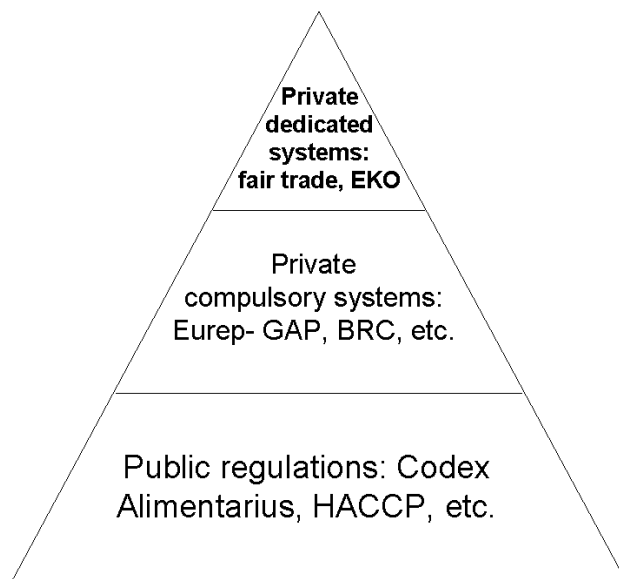


Figure 1. Different levels of food safety and quality standards.

3. Use of standards in different regions

In industrialized countries most companies in the food chain comply with basic standards on food safety and quality. For developing country producers the situation is more difficult. In the following we will look in more detail at the use of food quality and safety standards in three different regions. The information is based on a comparative research into the use of quality and safety standards in three regions: EU industrialized countries, Mercosur emerging economy countries, and ACP least developed countries. In 12 countries extensive inventories of food legislation and standards were carried out in 2003 and 2004, based on expert interviews and secondary material (government reports, reports from certification institutes, etc.). The results of these inventories were confirmed at a large international meeting in June 2005 (Trienekens et al, 2005). In the following description of standards a distinction is made between primary production and processing and distribution.

Primary producers in EU

Good Agricultural Practices and Good Health Practices (GAP/GHP) are generally used in primary production in EU countries. In most of the "old" EU countries (the EU-15) in recent years extended legislation has been defined to further assure safe production, such as the Pesticides Law in The Netherlands and specific laws on additives and labelling of allergens in Denmark. Interesting in this regard is the British Pesticides Safety Directorate (PSD) for its "name and shame" policy: if a company violates these standards, it will be publicly "shamed". Besides generally applied standards and legislation, there are many private (often retail) standards aiming at the primary producer. Examples for fruit and vegetables are sustainability standards such as Agro-Milieukeur in The Netherlands and Genesis QA in UK (with a focus on physical and microbiological residues), EKO (organic EU food standard) and international retail standards such as Eurep-Gap and Nature's Choice of Tesco (with extended demands on environmental issues). For production of beef also a large number of private standards exist, such as the chain-wide Integrated Quality management (IKB) in the Netherlands (control of growth hormones, salmonella, etc.) and Farm Assured British Beef and Lam in UK. Nevertheless, large differences exist between EU countries. In Portugal, for

example, there is still a very high level of non-compliance to regulations (a 2000 research gave a percentage of 14% non-compliance in agro- and food). On the other hand, especially in Southern EU countries, we see emergence of standards related to regional products and organic food.

Primary producers in Mercosur/ACP

Export-oriented producers in Mercosur countries often use GAP or GHP to comply with international quality and safety demands. Many of these producers are also ISO certified. A number of large export oriented vegetables and fruit producers follow Eurep-Gap or Eurep-Gap like standards. Mercosur countries increasingly try to comply with international standards. For example, in Argentina beef labelling is regulated conform EU norm 820/97 and for export oriented companies beef traceability is compulsory until the farm of origin. In ACP countries GAP/GHP is only applied by very few export-oriented farms. However, an increase of the use of GAP is reported in some of the least developing countries (e.g. in the Caribbean), supported by organizations like marketing boards. Application of Eurep-Gap is even more seldom, only a few large farms that deliver directly to Western supermarkets produce according to Eurep-Gap or Eurep-Gap like standards.

Processing/distribution in EU

In EU, since 1998, HACCP is obligatory for all companies in the food chain, except for the primary producer. In many countries standards have been developed which go even a step further. For example, in Denmark a HACCP norm is accepted that includes specific attention to provision of management information. This system (DS 3027) is on the forefront of quality system development and is one of the pillars of the new ISO standard 22000 on food quality. Denmark is also in front of developing principles for self-monitoring. An international retail standard that has emerged in the last years is BRC (British Retail Consortium), a HACCP based standard with extra attention for factory environment and production facilities. BRC is now compulsory for suppliers of many of the large retailers in Europa. Just as is the case in primary production, also in processing and distribution large differences exist between EU countries. For example, in Portugal, in March 2003 there were only very few companies HACCP certified (the country study delivered a result of only 12 companies).

Processing/distribution in Mercosur/ACP

In Mercosur countries HACCP is mainly applied at export (packing) firms. For example, since June 2003 all export-packers and processors in Argentina should be HACCP certified. In ACP countries HACCP systems are especially used in specific export sectors, such as fish from Lake Victoria in Uganda and fruit exports from Caribbean countries. Although, these systems are fragile as is shown by the high refusal rate of these products on Western markets due to discovery of pesticides residues etc. In export sectors often more systems are used concurrently. For example, processors and packers of fish for export use GMP, ISO 90002 and HACCP. In general, however, within these countries there are hardly uniform standards for processors and distributors.

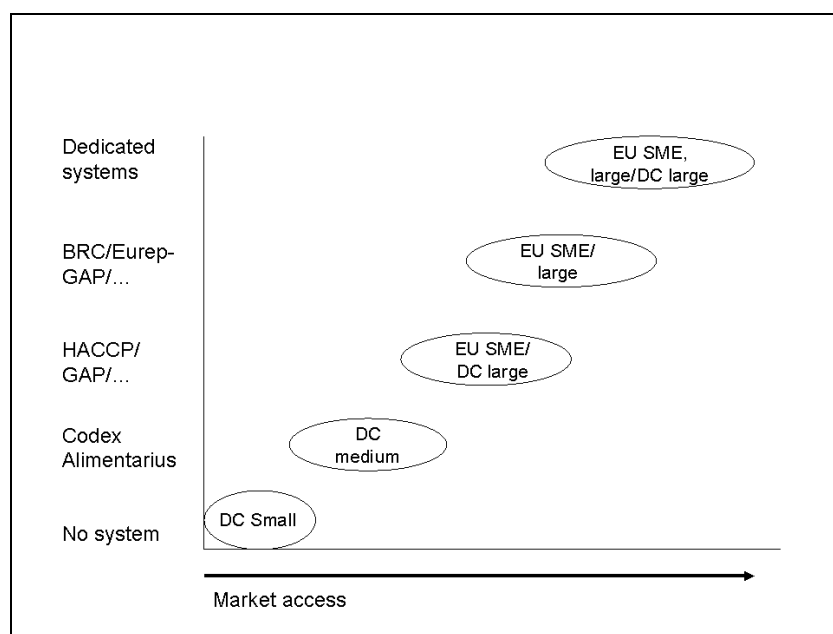
4. Challenges to the food system

The developments described in the previous sections put serious pressure on the international food system. In this section we will consider major challenges concerning market access for (small and medium) producers in non-industrialized countries.

4.1 Market access for small en medium size producers from non-industrialized countries

Figure 2 pictures (stylised) how standards used by different types of companies are related to (international) market access. As described in section 3 it is difficult for small and medium size enterprises from developing countries to comply with standards as required in Western markets. There are various reasons for this:

- SPS (Sanitary and Phytosanitary Measures) and TBT (Technical Barriers to Trade) often constitute barriers for export from developing countries to industrialized countries;
- producers most times lack awareness and adequate information about specific demands of western standards;
- the multitude of standards in industrialised countries differ from country to country and from market to market;
- the lack of harmonization of national MRL (maximum residue level) requirements in these countries;
- costs of certificates are in many cases barriers for non-western producers.



(DC=developing country, SME= small and medium enterprises)

Figure 2 Market access for producers using different food safety standards.

Another important barrier for developing country producers to take part in international chains is the lack of an enabling environment (institutional and infrastructure facilities). For example, many countries lack skilled people and laboratory facilities, which makes good quality management difficult.

The developments described above lead to the emerging of different agri- and food sub-systems in developing countries. These sub-systems aim at different market-outlets and have very distinct characteristics. Figure 3 (Ssemwanga, 2005) depicts 3 sub-systems: A-system, B-system and C-system.

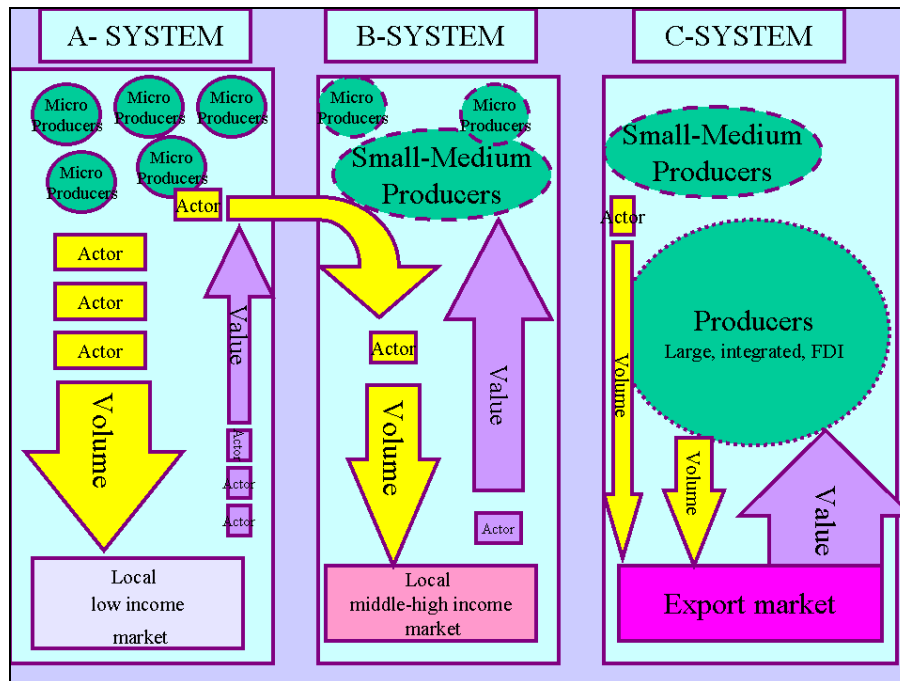


Figure 3: sub systems in Agricultural production in developing countries (Ssemwanga, 2005)

The A-system can be characterized as the local low-income chain. Producers are small with traditional production systems. These chains aim at the local markets with traditional products. Because of many intermediary parties (traders), A-system chains are relatively long, whereas most of the chain participants add little or no value. A-systems in developing countries deliver a high share of agricultural production volume, but generate relatively little value.

The B-system can be characterized as the local middle to high income chain. B-systems aim at the emerging supermarket sector in many developing countries. Most of the volume in these chains is delivered by small/medium size producers. Micro producers deliver input on demand to balance demand and supply in this system. Although the production volume produced by B-systems is smaller than that of A-systems, value generated is larger. B-systems increasingly produce according to national and sometimes international retail quality and safety standards.

The C-system can be characterized as export chain. It is completely focused on export, although low quality or rejected products are sold at the national, in many cases retail, market. The trend is towards increasing economies of scale and foreign direct investments. Export chains tend to become more integrated and shorter. Although volumes are small compared to local markets, value created is high.

The development of weakly connected sub-systems poses big challenges on the development of harmonized quality and safety standards in these countries.

The next section will discuss major trends, bottlenecks and opportunities for the development of quality and safety systems and standards in the three regions, based on the different country studies.

4.2 Trends, bottlenecks and opportunities related to food safety and quality

Table 1 depicts major bottlenecks and opportunities as found in (Trienekens, 2005) related to food quality and safety in the three regions.

| | Trends | Bottlenecks | Opportunities |
|----------|---|--|--|
| EU | <ul style="list-style-type: none"> - Consumer awareness regarding food safety and quality - Innovative materials/products - Niche markets (e.g. organic farming) | <ul style="list-style-type: none"> - Insufficient communication on food safety and quality - Lacking knowledge of consumers on food safety and quality issues - Low dissemination of R&D knowledge on food safety and quality - Many private quality labels and public quality regulations | <ul style="list-style-type: none"> - Traceability to gain consumer confidence - Knowledge and experience dissemination through the chain - Monitoring to ensure safety and quality of food - Possibilities for self regulation |
| Mercosur | <ul style="list-style-type: none"> - Focus on international markets (beef, soy, orange, coffee, pork, etc.) - Increasing local markets (Brazil 170 million; Argentina 40 million) | <ul style="list-style-type: none"> - Uneven income distribution - Lack of coordination (horizontal and vertical) - Lack of infrastructure (cold chain and roads/ports) | <ul style="list-style-type: none"> - Standards (PP) harmonization within countries and among Mercosur countries - Coordination to improve inspections and enforcement - Improvements of infrastructures |
| ACP | <ul style="list-style-type: none"> - Development of codes and standards - (Slowly) improving infrastructure/ distribution - Producer collaboration | <ul style="list-style-type: none"> - No laboratories to analyze samples - No investments in transport and storage - Lack of legal framework - Lack of market information - Lack of skilled / educated people - Often instable political environment | <ul style="list-style-type: none"> - Middle-east as new market - Improving feed and feeding system - PP network development - Cheap labor costs. |

Table 1 Trends, bottlenecks and opportunities in international food chain development in different countries and regions

Countries in the European Union focus on consumer related topics with regard to quality and safety management. Consumers increasingly are aware of safety and quality aspects and companies should increasingly focus on consumers for the execution of food quality and safety management for example by a clear traceability system. Chains in this region have to comply with many private and public demands on quality and safety of foods which result in multiple audits. Moreover companies are involved in development of innovative products, such as organic products, and innovative packaging materials. Communication about food safety and quality in the chain should be improved, e.g. dissemination of R&D knowledge to other parties in the chain.

Mercosur countries focus on developing new markets, both national and international. Mercosur countries have considerable home markets, but due to unequal income division, requirements on these markets differ heavily, which results in the development of separate sub-systems including different quality and safety requirements for national and international

markets. In fact this group of countries are in the middle of a process of awareness and adoption of quality and safety regulations both by governmental organizations as by businesses. The design of regulative structures to ensure food safety and quality has a priority in Mercosur countries. In this regard, food safety policies in Mercosur countries are greatly influenced by the requirements of international trade. A major criticism is that food control is not adequately done, there are very few activities involving preventive inspection, little attention is paid to education of these standards and the sanction system is weakly developed.

ACP countries are laying behind compared to Mercosur countries. ACP countries are in a phase of discovering quality and safety of food as important conditions of international food trade and have to start from scratch. Important issues often deal about what, which and how quality regulations and systems should be adapted. Moreover the building of facilities to improve quality regulations and the building of governmental structures for ensuring quality and safety of products are key points of attention. Investments in (cooled) transportation and storage are necessary to effectively participate in international trade. Governments may encourage financial institutions to avail credit to farmers and play a facilitating role by providing market information, education and the establishment of standards.

5. Conclusions and outlook

From the previous sections in this paper it can be concluded that in the European Union a mature situation for quality legislation has been reached. Availability of food is not a problem and the same holds for the compliance to basic quality legislations and standards. Problems are being found in the continuous diversification of quality management systems, legislations and changing demands of consumers. Moreover these systems and legislation become more and more detailed and stringent, due to increasing interaction of the government and increasing demands of retailers. This places many burdens on companies. Contrary, Mercosur and ACP countries are at a stage of awareness, developing and organising new quality legislation and quality systems. Because these countries export to the European Union and other Western countries, they are facing new demands. Compliance to these demands opens new markets for them. At the same time we see that opening-up new markets for these countries leads to co-existence of sub-systems with different market-outlets..

The future focus of EU research in international food chains should be on the role of consumers in the chain and how to fulfil new consumer demands. For Mercosur countries the research focus should be on integration and harmonization of standards and regulations, both on international and domestic level. For ACP countries market access and development of necessary infrastructures are two key research themes.

References

Giovanucci, D. and Reardon, T., 2001. Understanding grades and standards and how to apply them. In: A guide to developing agricultural markets and agro-enterprises. Edited by Daniele Giovannuci. Washington: The World Bank.

Ssemwanga, J., 2005. Powerpoint presentation at Closing Seminar of EU Concerted Action "SafeACC" at 19 May 2005 in Buenos Aires, Argentina.

Trienekens J., W.van Plaggenhoef, S. Boschma, S.Willems, L.Esjberg, 2005, Research agenda on safe and high quality international food chains, EU Concerted Action SafeACC, ACC publication 2005 and www.globalfoodnetwork.org, pp 26.

Tunçer, B., 2001. From Farm to Fork? Means of Assuring Food Quality; An analysis of the European food quality initiatives, thesis, Lund, Sweden, IIIIEE Reports 2001:14

Unnevehr, Laurian J., 2000. Food safety issues and fresh food product exports from LDCs. *Agricultural Economics*, 23(3), 231-240.

Vellema, S. and D. Boselie, 2003. Cooperation and competence in global food chains. Perspectives on food quality and safety. Shaker Publishing, Maastricht.

Opara, L.U. and Mazaud, F., 2001. Food traceability from field to plate. *Outlook on Agriculture*, 30, 239-247.

Trienekens, J.H. and Omta, S.W.F., 2002, Introduction. In: J.H. Trienekens and S.W.F. Omta (Eds.), *Fifth International Conference on Chain and Network Management in Agribusiness and the Food Industry*. Wageningen Academic Publishers, Noordwijk, pp. 1.