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Managing crop production for food safety and quality: the role of Good Agricultural Practice

The production of primary plant products as food and feed raw materials is an integral part of the supply chain. Food and feed safety and the impact of production activities are of concern to consumers, industry and governments. Compliance with the demands and expectations of the marketplace and meeting legal requirements is a key consideration for producers and suppliers of primary agricultural products. Good agricultural practice (GAP) provides a framework for current and future food and feed production and helps meet the challenge of producing more from increasingly finite resources. GAP as exemplified by private voluntary standards is also becoming a key feature of governance in the food supply chain. Meeting accepted good practice therefore is the key to successful and sustainable production and marketing of primary products. Compliance with accepted practices is the prerequisite to market access and customer and consumer confidence.

GAP is a completely integrated approach that links food safety with environmental and social welfare and encompasses best production practices that take into account customer and consumer demands and expectations and the sensitive use of increasingly scarce natural resources.

This white paper, written in conjunction with CABI, gives more information on good agricultural practice (GAP) and the private voluntary standards that underpin GAP and increasingly are an important aspect of governance in the supply chain.

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Introduction

Food (and feed) safety management and control of hazards significant to health in crop production is a key aspect of sound agricultural production practice. Safety encompasses issues around hygiene, pesticide use and natural contaminants, including for example mycotoxins and heavy metals. The customer and consumer expect that producers should take the necessary steps to ensure that their food is safe. Failure to apply the highest food safety standards can have a severe impact on confidence, which can spread to the whole of the supply chain, even in product sectors or countries not associated with the failures. For example, the *E coli* outbreak in Germany in 2011 on sprouted seeds where 1200 cases of illness were reported led to import bans of products from the EU by a number of countries and had consequential effects on related salad products with associated loss of sales. A reputation for safe and healthy products is hard won but can all too easily be lost and can take considerable time and effort to recover.

Such examples serve to underline the need for greater transparency in the supply chain and the implementation of good agricultural practice (best practice) at primary production level. In addition to actual food safety, the concept of quality has also been redefined in recent years to encompass both traditional product characteristics and intrinsic quality attributes that relate to the way the product is produced, including environmental and social welfare issues. Issues that relate to the way a product is produced and its impact on the environment are increasingly seen as an important marketing attribute as well as a prerequisite for sustainable and equitable production. Environmental welfare issues are likely to become even more important in all agricultural production as we move forward to 2050 and the predicted scarcity of natural resources, such as water, soil, energy and biodiversity, coupled with a predicted 9 billion consumers.

The impact of food production activities (and the failure of such activities on food safety and the environment) in the supply chain has become of increasing concern to governments, the food industry and consumers, and failures in the food chain are very quickly and widely exposed through traditional media, social media and other consumer networks. One manifestation of this has been a greater emphasis on the management of food safety and intrinsic quality attributes as specified in guidelines, codes of practice and technical standards.

Key facts about Good Agricultural Practice

Good Agricultural Practice (GAP) is a term relating to the adoption of management practices that utilize resources effectively and sustainably, whilst ensuring the highest standards of food safety and environmental and social welfare and at the same time allow economic agriculture to continue. It is a collection of principles for application to on-farm production and post-production processes which result in safe and healthy food products, while taking into account environmental and social welfare. The social aspects relate to the ethical dimension of food production, including worker rights and animal welfare. The issues that relate to the environment focus on the efficient and sustainable use of resources and minimising the environmental impact of production processes.

There are two categories of GAP standards: legislative and voluntary

- The first category relates to codes of practice, guidelines and laws that focus on specific aspects of production, but which have a limited scope in terms of the overall production process, e.g. pesticide use. These codes or guidelines are usually issued by governmental organisations or industry associations to ensure compliance with regulations or provide guidance based on scientific and technical knowledge.

- The second category relates to Private Voluntary Standards (PVS) which have been developed by the private sector to ensure compliance with regulatory requirements in terms of food safety and meet marketplace demands and expectations on the way food is produced, including intrinsic quality attributes. These standards have become a key element of governance in the global agri-food supply chain, increasingly influencing both domestic business and international trade.

In addition, three types of PVS can be identified:-

1. International standards designed to be adopted by organisations in different countries so acting as a global standard (e.g. GlobalGAP)
2. National standards set by organizations that operate within the boundaries of individual countries (e.g. Red Tractor Assurance in the UK)
3. Company-specific standards that are developed internally and apply to the supply chain of a company.

Generally, private standards have a relatively broad scope in terms of agricultural production and are not limited to specific aspects of production and are more representative of agricultural production processes and GAP as a whole. However, a disadvantage to PVS is that different standards have not been developed with the same intentions and with the same applicability. PVS have different objectives or address different situations, e.g. whole farm approaches, specific crop or livestock operations, or have specific production objectives. Some PVS have a global reach and are focussed on either specific crop sectors, e.g. produce and combinable crops, standards for specific production systems, e.g. organic and integrated farming systems, or aspects pertaining to the ethical dimension of production, e.g. social rights and a fair return for producers. As a result, the scope of each standard varies in terms of the requirements and approaches in relation to the elements of sustainability. However, there are some key good agricultural practices that are common to most if not all PVS, e.g. those relating to soil, but even here specific criteria in relation to soil structure, drainage, compaction, organic matter status, nutrients and biological health may vary.

Nonetheless the approaches to GAP as exemplified by PVSs do represent what is good practice albeit from possible different objectives. In some respects they are the only representation of GAP as a set of processes by which crop products are produced and handled, taking into account food safety and environmental welfare considerations. There is presently no concerted action to standardize GAP based on these PVSs. The GlobalGAP series of standards is perhaps the most accepted in terms of an exemplar of GAP. Similarly the GFSI (Global Food Safety Initiative) primary production standards represent a core approach to good hygiene practice in agriculture on which other standards can be benchmarked. However, it is an appreciation of GAP as outlined by PVSs that is necessary for sustainable production of food that is safe, has limited environmental impact and at the same time is economically viable.

Conclusions

Currently, the adoption of good agricultural practice through compliance with accepted standards of good practice is essential for food safety, sustainable production for consumer confidence and choice, and brand marketing. Going forward, the predicted rise in global population and changing diets linked to rising wealth in emerging markets will place an even greater strain on already stressed natural resources for food production. The wider and increasing use of social media is also quick to pick up on bad practices in the food chain, including in social and labour issues, animal welfare and impact on the environment, making the need for transparency and adoption of good practice more important than ever.

More food and feed produced safely in environmentally and socially accepted ways is needed and this is especially true in developing countries. 58% of food is already consumed by developing countries and this is expected to rise to 72% by 2050. Most people will live in cities and rely on best practice in the production of their food, as opposed to growing their own produce. A completely integrated approach that links food safety with environmental and social welfare is needed. Such an approach should encompass best production practices that take into account customer and consumer demands and expectations and the sensitive use of increasingly scarce natural resources - less water, less energy and less land. Agriculture currently accounts for 70% of water use and up to 30% of greenhouse gas emissions. This includes 16% from deforestation and associated loss of biodiversity. The challenge going forward is to produce more safe and wholesome food, on fewer natural resources and to design an agricultural system or systems that are adaptable to climatic change (climate smart). What is essential is to provide producers/farmers with better knowledge and skills to understand how to produce more efficiently and with respect to their environment whilst meeting the needs of the customer. GAP should incorporate 'people' (safe and wholesome food, social welfare), 'planet' (environmental welfare, sustainable production) and 'profit' (economic viability).

Good Agricultural Practice as exemplified by PVSs represents such an integrated approach to food production. GAP can encompass elements of specific crop husbandry and good practices but is also flexible enough to be applied to most crop production situations in order to address some of the environmental and social welfare challenges in food production in the next 30 years.

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Created May 2013