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Development of a Framework for Good Agricultural Practices

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I. INTRODUCTION

1. The concept of Good Agricultural Practices (GAP) has evolved in recent years in the context of a rapidly changing and globalizing food economy and as a result of the concerns and commitments of a wide range of stakeholders about food production and security, food safety and quality, and the environmental sustainability of agriculture. These stakeholders include governments, food processing and retailing industries, farmers, and consumers, who seek to meet specific objectives of food security, food quality, production efficiency, livelihoods and environmental benefits in both the medium and long term. GAP offers a means to help reach those objectives.
2. Broadly defined, GAP applies available knowledge to addressing environmental, economic and social sustainability for on-farm production and post-production processes resulting in safe and healthy food and non-food agricultural products. Many farmers in developed and developing countries already apply GAP through sustainable agricultural methods such as integrated pest management, integrated nutrient management and conservation agriculture. These methods are applied in a range of farming systems and scales of production units, including as a contribution to food security, facilitated by supportive government policies and programmes.
3. The development of a food chain approach to food safety and quality¹ has profound implications for agricultural production and post-production practices and offers the opportunity to address sustainable use of resources. At present, GAP is formally recognized in the international regulatory framework for reducing risks associated with the use of pesticides, taking into account public and occupational health, environmental, and safety considerations. The use of GAP is also being promoted increasingly by the private sector through informal codes of practice and indicators developed by food processors and retailers in response to emerging consumer demand for sustainably produced and wholesome food. This trend may create incentives for the adoption of GAP by farmers by opening new market opportunities, provided they have the capacity to respond.
4. FAO has initiated a process of discussion and consultation to take stock of the different developments and debate on GAP so as to make Members aware of the opportunities and issues in the further elaboration of GAP and ultimate adoption by farmers. FAO's role may be to support these developments with comprehensive, objective, professional expertise and to advise governments on their scientific validity and policy implications. A broadly accepted framework of GAP principles, generic indicators and practices will help guide debate on national policies and actions and on the preparation of strategies to ensure that all stakeholders participate in and benefit from the application of GAP in the food chain.
5. The next section of this paper sets out the context and approach to GAP with respect to food security and the on-farm stages of the food chain. The third section reviews current applications of GAP by the public and private sectors, civil society and farmers. The fourth section elaborates a proposed framework of principles and generic indicators and practices to guide further debate and action. In the fifth section, a way forward for developing GAP guidelines for on-farm production and post-production systems is proposed. The paper concludes by identifying issues for consideration by COAG and seeks guidance on FAO's role in further developing the concept of GAP.

¹ See COAG/2003/5 for the food chain approach to food safety and quality.

II. CONTEXT AND APPROACH TO GAP

6. The World Food Summit Plan of Action and the Millennium Development Goals commit governments to reduce hunger by half by 2015. FAO reports slow progress in meeting this goal, and further estimates that global food production will need to increase by 60% to close nutrition requirements' gaps, cope with population growth and accommodate changes in diets over the next three decades. At the World Summit on Sustainable Development (WSSD) in September 2002, governments agreed upon a Plan of Implementation, and voluntary Partnerships/Initiatives were launched by governments, international agencies, the private sector, non-governmental organizations (NGOs) and civil society organizations (CSOs). They include actions to promote sustainable agriculture and natural resources management contributing to food security - access to sufficient, safe, and nutritious food - and improved livelihoods, in particular in reference to Chapter 14 of Agenda 21 on Sustainable Agriculture and Rural Development (SARD).

Agriculture is expected to assure food security in a range of settings, now and in the future, and is increasingly called upon to reduce any negative ecosystem impact while producing positive environmental, social and economic benefits.

7. Attainment of these goals is affected by many factors, including technology, social and economic developments, and associated government policies and programmes. These factors are amplified by globalization, which is progressively changing how and where food and farm products are produced, processed and traded. Consumer concern is growing in all parts of the world over the environmental, economic and social sustainability, public health implications and safety of agricultural practices and products. Processors and retailers must match the anticipated market demands with the available supply of food in a lengthening food chain. Farmers need to have the capacity to make new farming and technology choices to meet demands for a safe and healthy diet in response to new regulations and standards, changing global consumption patterns, improved market access (through provision of safe food) and potential value-added opportunities. Governments provide the enabling policy and regulatory framework particularly concerning food safety, agricultural production and trade, while seeking to meet food security objectives.

8. While GAP responds, in part, to the growing demands of a globalized agriculture, the approach is also valid within the context of local food systems. Agriculture depends on viable communities and local food systems that provide the mechanism for farmers and consumers to benefit from a closer relationship between production and market, empowering local communities by creating and keeping financial and human resources within the community. The specific issues and constraints facing small-scale producers in developing countries need to be taken into consideration when formulating policies and programmes to develop and promote GAP.

9. The food chain approach to food safety and quality, elaborated in COAG/2003/5, recognizes that the responsibility for the supply of food that is safe, healthy and nutritious is shared along the entire food chain – by all involved with the production, processing, trade and consumption of food. The food chain approach to food safety and quality implies that GAP should be extended along the food chain to put greater emphasis on primary production practices.

III. CURRENT APPLICATIONS OF GAP

10. GAP applications are being developed by governments, NGOs/CSOs and the private sector to meet farmers' needs and specific requirements in the food chain, but not in a holistic or coordinated way. In many cases the development of GAP at international and national levels is complemented by more specific adaptations for use at local levels. A few examples of current applications follow.

11. Governments, international agencies and NGOs promote sustainable agricultural methods such as integrated pest management, integrated nutrient management and conservation agriculture, among others, aimed at mitigating specific environmental and societal risks in a range of production and farming systems. IPM is specified as a recommended practice in the Code of

Conduct on Pesticides and in Chapter 14 of Agenda 21. These methods are especially appropriate for small- or medium-scale farmers in developing countries, contribute to increased local food production and food security, and conserve natural resources.

12. National agencies have also promoted GAP for both quality assurance and environmental management. These include the government agencies of Canada, France, Malaysia, New Zealand, Uruguay, the United Kingdom and the United States. Latvia, Lithuania and Poland have adopted good practices with respect to the Baltic agricultural runoff programme. The national agricultural research organization of Brazil, EMBRAPA, in collaboration with FAO, is developing a series of specific technical guidelines for melons, mangoes, fruit and vegetables, field crops, dairy, beef, swine and poultry, based on GAP to be tested by small, medium and large-scale producers.

13. The private sector, in particular industrial processors and retailers, uses GAP with a view to attaining quality assurance, consumer satisfaction and profit in the production of safe and high quality food along the food chain. These efforts increasingly incorporate sustainability criteria in response to consumer demand. Examples include the EUREPGAP generic Codes of Practice for fresh produce, combinable crops and livestock; the Sustainable Agriculture Initiative (Unilever, Nestlé, Danone and others); and, the EISA Common Codex for Integrated Farming. Unilever has developed more specific “sustainable agriculture indicators” of achievement for specific crops and locations. The promotion of GAP by food processors and retailers can facilitate the adoption of sustainable agricultural practices by creating incentives through potential value-added opportunities for farmers.

14. NGOs are also working to address good practices, in particular for food crops. For example, the Better Banana Project, managed by a coalition of non-profit conservation groups and coordinated by the Rainforest Alliance promotes sustainability by certifying banana farms based on nine guiding principles. These address - among other elements - production practices, wildlife protection, and worker safety.

15. A further concrete example of the GAP approach is precise standards for organic production aimed at achieving optimal sustainable agro-ecosystems. These standards have been extensively elaborated to provide the basis for meeting growing consumer demands for production without the use of chemical fertilizers, pesticides, GMOs and other practices proscribed for organic agriculture. The Codex guidelines on organically produced food refer to the production process itself and aim to protect the consumer against misleading claims, protect organic producers from misrepresentation and guide governments in setting standards for the production, processing and labelling of organic produce.

16. A specific version of GAP is applied within established codes of practice for food safety, under Codex Alimentarius, to minimize or prevent contamination of food. The Codex Alimentarius Commission develops and adopts standards, guidelines and related texts on all aspects of food safety and quality reflecting consensus at the international level. Codex standards are reference points for developing and harmonizing national standards. Codex defines GAP in the use of pesticides to include “...nationally authorized safe uses of pesticides under actual conditions necessary for effective and reliable pest control”². The actual conditions include any stage of the production, storage, transport, distribution and processing of food commodities and animal feed. GAP in this context is used to set maximum residue levels for pesticides and is also recognized in the International Code of Conduct on the Distribution and Use of Pesticides.

17. While the Codex Alimentarius specifically defines GAP in the context of the use of pesticides, the Code of Practice (General Principles of Food Hygiene) and other more specific codes, address good practices in primary production as well as post-production systems. Some national programmes have extended the use of the term Good Agricultural Practices to refer to practices to minimize microbial food safety hazards in fresh produce.

² Codex Alimentarius Commission Procedural Manual. Tenth edition, 1997. p. 43

18. As part of the consultative process leading up to WSSD, NGOs and CSOs including farmers groups have highlighted some key elements of GAP. Among these are: working through community-based mechanisms to draw good practices from a broad range of approaches and systems, many of which combine traditional agriculture based on local knowledge with modern agriculture; empowering producers and strengthening farmers' organizations to begin to adopt GAP; recognizing the importance of fair returns to farmers for investments in environmental sustainability; and focusing efforts on humanely produced, safe and high quality foods that address food security.

19. As can be seen from these examples, GAP represents a multitude of approaches and applications addressing a range of needs in many parts of the world. This implies two challenges.

20. The first challenge is to ensure that extending the use of GAP will take into account the interests of smaller-scale producers in developing countries both for the safety and sustainability of domestic production. There is a range of sustainable production methods to produce crop and livestock products through integrated production systems with potential benefits on a wider scale, including sustainable intensification, livelihoods enhancement and higher production to meet future food needs. Secondly, the growing number of scattered initiatives for GAP risks burdening farmers with multiple codes of practice and regulations, fails to provide for an exchange of information on lessons learned, and could lead to uncertainty for consumers about producer claims.

21. A broadly accepted framework of GAP principles, indicators and practices may provide a reference point to guide debate on national policies and actions. It may also ensure that stakeholders at all levels of development benefit from the application of GAP in on-farm agricultural production and post-production systems. Such a framework would also provide transparency among all actors along the food chain, and promote harmonization of approaches and their indicators of achievement.

IV. PROPOSED GAP FRAMEWORK

22. Given the trend in the development and adoption of GAP, and the disparate applications described above, FAO has initiated a process of discussion and consultation to take stock of the ongoing developments and debate. It aims to make Members aware of the opportunities and issues in the further elaboration of GAP, and the potential roles and benefits for governments, food processing and retailing industries, farmers and consumers. A framework is proposed within which to seek an understanding and agreement on the principles, indicators and practices of GAP. Based on this framework, a strategy could be prepared for moving forward to develop GAP management guidelines for on-farm production and post-production systems for use within existing regulatory frameworks, private and public sector initiatives.

23. In the context of agreed international goals to reduce hunger and promote food security, four principles of GAP apply to all scales of farming:

- economically and efficiently produce sufficient, safe and nutritious food;
- sustain and enhance the natural resource base;
- maintain viable farming enterprises and contribute to sustainable livelihoods;
- meet the cultural and social demands of society.

24. GAP provides a means to assess and decide on farming practices at each step in the production process. For any given agricultural production system, a sound and comprehensive management strategy must be in place providing for the capability for tactical adjustments in response to changes in circumstances. Implementing such a management strategy requires knowing, understanding, planning, measuring, monitoring, and record-keeping, with the aim of achieving production, safety and sustainability goals. Successful implementation depends upon developing the skill and knowledge bases, on continuous monitoring and analysis of performance, and the use of expert advice as required.

25. Accordingly, the proposed process of developing and supporting the adoption of GAP is to:

- Formulate a set of generic practices and indicators from which guidelines for good agricultural practices for on-farm production post-production systems can be developed, collaboratively by the public and private sectors and civil society.
- Focus existing knowledge, options, and solutions into effective food safety and environmental risk analysis guidelines available for use as policy instruments.
- Review existing codes of practice.
- Translate codes of practice into management guidelines for crop and livestock systems in specific agro-ecozones.
- Engage in discussion with governments on their strategies, priorities and instruments to move towards sustainable agriculture and rural development practices.

26. With partners, FAO is developing a set of ten component groups of generic indicators and practices of GAP. These include aspects related to soil and water management, crop and fodder production, crop protection, animal production and health, harvesting and on-farm processing and storage, on-farm energy and waste management, human welfare, health and safety, and wildlife and landscape, as set forth in the Annex.

27. The implementation of GAP is generally through a process of assessing the critical management choices that are made sequentially throughout the production of crops and livestock. At each decision control point the implications for GAP are assessed in the context of the indicators shown in the Annex, which serve as the basis for analysing food safety, environmental and societal risks. This process may be used to prepare codes of practice for major agricultural production systems, and detailed management guidelines for individual production systems within specific agro-ecozones. By definition, GAP should be explicitly linked to a farming systems categorization in order to apply indicators and practices within a defined domain. It should also take into consideration the opportunities and constraints existing in different contexts, such as labour constraints generated by HIV/AIDS in some areas.

28. Several issues may arise in the application of codes of practice and management guidelines elaborated using the proposed GAP framework. The value of the framework itself will depend upon the adoption of practices by farmers, involvement of the food industry, demand by consumers and support from governments through enabling policies and extension services. Meanwhile, as consumers are increasingly demanding sustainable agricultural practices, application of GAP can, in some cases, result in higher production, processing and marketing costs, which informed consumers might be prepared to absorb. This will create further incentives for the adoption of GAP and its promotion by the private sector. In parallel to the development of GAP, new codes of conduct for agriculture are under discussion in the emerging areas of biotechnology and biosafety, and their relationship to GAP will need to be considered.

V. THE WAY FORWARD

29. The next stage in the process is to develop GAP guidelines for on-farm production and post-production systems, involving the participation of farmers, and bringing together scientific and technical expertise, and civil society. FAO's role could be to support the development of quality assurance schemes and codes of practice with comprehensive, objective, professional expertise, and to advise governments on their scientific validity and policy implications.

30. The technical resources of FAO provide policy advice and technical support to address current developments concerning GAP in Member Nations in collaboration with other International Agencies, NGOs/CSOs and the private sector. This has been interpreted in the Medium Term Plan 2002-07 under the Integrated Production Systems Priority Area for Interdisciplinary Action as:

- Maintain a common information base on promising integrated production techniques for major agroecological zones, by collecting, analysing and disseminating information (data, summary reports) on good practices in relevant geographical contexts.
- Pilot projects to verify the conditions of application of selected promising techniques in systems that have potential for sustainable production increases.
- Decision-support systems promoted in countries based on knowledge accumulated through the above activities.

31. Several FAO programme entities contribute to development of GAP for food and environmental sustainability, including Sustainable Intensification of Production Systems (210A1); Land and Soil Productivity (211A2); Strategies and Technologies for Sustainable Crop and Grassland Production Systems (212A3); and Technologies and Systems for Efficient Natural Resource Use in Livestock Production (213A8). Other entities support FAO's role to assist with the adoption and implementation of international standards and codes for which Codex food safety standards and guidelines have been designed, and the associated capacity building, training, development and field implementation in the context of the different production systems and agro-ecozones. These include: Enhancing Food Quality and Safety by Strengthening Handling, Processing and Marketing in the Food Chain (214A9); Capacity Building and Risk Analysis Methodologies for Compliance with Food Safety Standards and Pesticide Control (215P1); Food Quality Control and Consumer Protection (221P5); Food Safety Assessment and Rapid Alert System (221P6); and Food Quality and Safety Throughout the Food Chain (221P8).

32. FAO, through its Food and Nutrition Division, is implementing several activities for improving the quality and safety of fresh produce including a Prevention of Food Losses (PFL) programme, to establish a Global Inventory, Reference Materials and Food Safety Training Programme for Improving the Quality and Safety of Fresh Fruits and Vegetables.

33. The development of GAP also offers a mechanism to implement concrete actions towards achieving agricultural production aspects of SARD called for within Chapter 14 of Agenda 21 and reviewed at the Sixteenth Session of COAG. FAO has facilitated dialogue with governments and Major Groups on the concept of good practices, as well as access to resources and fair employment.

VI. VIEWS AND RECOMMENDATIONS FROM COAG

34. COAG is invited to consider the proposed framework and process for developing an approach to GAP at policy, generic practice, indicator and guideline levels through consultation and dialogue with Member Nations, NGOs/CSOs, the private sector and consumers.

35. COAG may wish to provide guidance on the implications and opportunities of addressing good agricultural practices in FAO's programmes through:

- Further development of FAO's programmes relating to GAP as part of the Integrated Production Systems PAIA in a range of agricultural production systems and agro-ecozones. This would be linked to ongoing development of good practices in land and water use, crop and livestock production and health, on-farm processing and storage, energy and waste management in the food chain.
- Policy advice and field activities, including capacity building, implemented through Technical Cooperation Projects, projects within the Special Programme for Food Security, and bilateral projects. These would relate to the formulation and implementation of good agricultural practices of a holistic and multidisciplinary nature for crop and livestock production through to the horizontal and vertical integration of markets.

ANNEX: GOOD AGRICULTURAL PRACTICES FOR SELECTED AGRICULTURAL COMPONENTS

Soil

i) The physical and chemical properties and functions, organic matter and biological activity of the soil are fundamental to sustaining agricultural production and determine, in their complexity, soil fertility and productivity. Appropriate soil management aims to maintain and improve soil productivity by improving the availability and plant uptake of water and nutrients through enhancing soil biological activity, replenishing soil organic matter and soil moisture, and minimizing losses of soil, nutrients, and agrochemicals through erosion, runoff and leaching into surface or ground water. Though soil management is generally undertaken at field/farm level, it affects the surrounding area or catchment due to off-site impacts on runoff, sediments, nutrients movement, and mobility of livestock and associated species including predators, pests and biocontrol agents.

ii) Good practices related to soil include maintaining or improving soil organic matter through the use of soil carbon-build up by appropriate crop rotations, manure application, pasture management and other land use practices, rational mechanical and/or conservation tillage practices; maintaining soil cover to provide a conducive habitat for soil biota, minimizing erosion losses by wind and/or water; and application of organic and mineral fertilizers and other agrochemicals in amounts and timing and by methods appropriate to agronomic, environmental and human health requirements.

Water

iii) Agriculture carries a high responsibility for the management of water resources in quantitative and qualitative terms. Careful management of water resources and efficient use of water for rainfed crop and pasture production, for irrigation where applicable, and for livestock, are criteria for GAP. Efficient irrigation technologies and management will minimize waste and will avoid excessive leaching and salinization. Water tables should be managed to prevent excessive rise or fall.

iv) Good practices related to water will include those that maximize water infiltration and minimize unproductive efflux of surface waters from watersheds; manage ground and soil water by proper use, or avoidance of drainage where required; improve soil structure and increase soil organic matter content; apply production inputs, including waste or recycled products of organic, inorganic and synthetic nature by practices that avoid contamination of water resources; adopt techniques to monitor crop and soil water status, accurately schedule irrigation, and prevent soil salinization by adopting water-saving measures and re-cycling where possible; enhance the functioning of the water cycle by establishing permanent cover, or maintaining or restoring wetlands as needed; manage water tables to prevent excessive extraction or accumulation; and provide adequate, safe, clean watering points for livestock.

Crop and Fodder Production

v) Crop and fodder production involves the selection of annual and perennial crops, their cultivars and varieties, to meet local consumer and market needs according to their suitability to the site and their role within the crop rotation for the management of soil fertility, pests and diseases, and their response to available inputs. Perennial crops are used to provide long-term production options and opportunities for intercropping. Annual crops are grown in sequences, including those with pasture, to maximize the biological benefits of interactions between species and to maintain productivity. Harvesting of all crop and animal products removes their nutrient content from the site and must ultimately be replaced to maintain long-term productivity.

vi) Good practices related to crop and fodder production will include those that select cultivars and varieties on an understanding of their characteristics, including response to sowing or planting time, productivity, quality, market acceptability and nutritional value, disease and stress resistance, edaphic and climatic adaptability, and response to fertilizers and agrochemicals; devise crop sequences to optimize use of labour and equipment and maximize the biological benefits of weed control by competition, mechanical, biological and herbicide options, provision of non-host crops to minimize disease and, where appropriate, inclusion of legumes to provide a

biological source of nitrogen; apply fertilizers, organic and inorganic, in a balanced fashion, with appropriate methods and equipment and at adequate intervals to replace nutrients extracted by harvest or lost during production; maximize the benefits to soil and nutrient stability by re-cycling crop and other organic residues; integrate livestock into crop rotations and utilize the nutrient cycling provided by grazing or housed livestock to benefit the fertility of the entire farm; rotate livestock on pastures to allow for healthy re-growth of pasture; and adhere to safety regulations and observe established safety standards for the operation of equipment and machinery for crop and fodder production.

Crop Protection

vii) Maintenance of crop health is essential for successful farming for both yield and quality of produce. This requires long-term strategies to manage risks by the use of disease- and pest-resistant crops, crop and pasture rotations, disease breaks for susceptible crops, and the judicious use of agrochemicals to control weeds, pests, and diseases following the principles of Integrated Pest Management. Any measure for crop protection, but particularly those involving substances that are harmful for humans or the environment, must only be carried out with consideration for potential negative impacts and with full knowledge and appropriate equipment.

viii) Good practices related to crop protection will include those that use resistant cultivars and varieties, crop sequences, associations, and cultural practices that maximize biological prevention of pests and diseases; maintain regular and quantitative assessment of the balance status between pests and diseases and beneficial organisms of all crops; adopt organic control practices where and when applicable; apply pest and disease forecasting techniques where available; determine interventions following consideration of all possible methods and their short- and long-term effects on farm productivity and environmental implications in order to minimize the use of agrochemicals, in particular to promote integrated pest management (IPM); store and use agrochemicals according to legal requirements of registration for individual crops, rates, timings, and pre-harvest intervals; ensure that agrochemicals are only applied by specially trained and knowledgeable persons; ensure that equipment used for the handling and application of agrochemicals complies with established safety and maintenance standards; and maintain accurate records of agrochemical use.

Animal Production

ix) Livestock require adequate space, feed, and water for welfare and productivity. Stocking rates must be adjusted and supplements provided as needed to livestock grazing pasture or rangeland. Chemical and biological contaminants in livestock feeds are avoided to maintain animal health and/or to prevent their entry into the food chain. Manure management minimises nutrient losses and stimulates positive effects on the environment. Land requirements are evaluated to ensure sufficient land for feed production and waste disposal.

x) Good practices related to animal production will include those that site livestock units appropriately to avoid negative effects on the landscape, environment, and animal welfare; avoid biological, chemical, and physical contamination of pasture, feed, water, and the atmosphere; frequently monitor the condition of stock and adjust stocking rates, feeding, and water supply accordingly; design, construct, choose, use and maintain equipment, structures, and handling facilities to avoid injury and loss; prevent residues from veterinary medications and other chemicals given in feeds from entering the food chain; minimize the non-therapeutic use of antibiotics; integrate livestock and agriculture to avoid problems of waste removal, nutrient loss, and greenhouse gas emissions by efficient recycling of nutrients; adhere to safety regulations and observe established safety standards for the operation of installations, equipment, and machinery for animal production; and maintain records of stock acquisitions, breeding, losses, and sales, and of feeding plans, feed acquisitions, and sales.

Animal Health and Welfare

xi) Successful animal production requires attention to animal health that is maintained by proper management and housing, by preventive treatments such as vaccination, and by regular inspection, identification, and treatment of ailments, using veterinary advice as required. Farm animals are sentient beings and as such their welfare must be considered. Good animal welfare is

recognized as freedom from hunger and thirst; freedom from discomfort; freedom from pain, injury or disease; freedom to express normal behaviour; and freedom from fear and distress.

xii) Good practices related to animal health and welfare will include those that minimize risk of infection and disease by good pasture management, safe feeding, appropriate stocking rates and good housing conditions; keep livestock, buildings and feed facilities clean and provide adequate, clean bedding where livestock is housed; ensure staff are properly trained in the handling and treatment of animals; seek appropriate veterinary advice to avoid disease and health problems; ensure good hygiene standards in housing by proper cleansing and disinfection; treat sick or injured animals promptly in consultation with a veterinarian; purchase, store and use only approved veterinary products in accordance with regulations and directions, including withholding periods; provide adequate and appropriate feed and clean water at all times; avoid non-therapeutic mutilations, surgical or invasive procedures, such as tail docking and debeaking; minimise transport of live animals (by foot, rail or road); handle animals with appropriate care and avoid the use of instruments such as electric goads; maintain animals in appropriate social groupings where possible; discourage isolation of animals (such as veal crates and sow stalls) except when animals are injured or sick; and conform to minimum space allowances and maximum stocking densities.

Harvest and On-farm Processing and Storage

xiii) Product quality also depends upon implementation of acceptable protocols for harvesting, storage, and where appropriate, processing of farm products. Harvesting must conform to regulations relating to pre-harvest intervals for agrochemicals and withholding periods for veterinary medicines. Food produce should be stored under appropriate conditions of temperature and humidity in space designed and reserved for that purpose. Operations involving animals, such as shearing and slaughter, must adhere to animal health and welfare standards.

xiv) Good practices related to harvest and on-farm processing and storage will include those that harvest food products following relevant pre-harvest intervals and withholding periods; provide for clean and safe handling for on-farm processing of products. For washing, use recommended detergents and clean water; store food products under hygienic and appropriate environmental conditions; pack food produce for transport from the farm in clean and appropriate containers; and use methods of pre-slaughter handling and slaughter that are humane and appropriate for each species, with attention to supervision, training of staff and proper maintenance of equipment.

Energy and Waste Management

xv) Energy and waste management are also components of sustainable production systems. Farms require fuel to drive machinery for cultural operations, for processing, and for transport. The objective is to perform operations in a timely fashion, reduce the drudgery of human labour, improve efficiency, diversify energy sources, and reduce energy use.

xvi) Good practices related to energy and waste management will include those that establish input-output plans for farm energy, nutrients, and agrochemicals to ensure efficient use and safe disposal; adopt energy saving practices in building design, machinery size, maintenance, and use; investigate alternative energy sources to fossil fuels (wind, solar, biofuels) and adopt them where feasible; recycle organic wastes and inorganic materials, where possible; minimize non-usable wastes and dispose of them responsibly; store fertilizers and agrochemicals securely and in accordance with legislation; establish emergency action procedures to minimize the risk of pollution from accidents; and maintain accurate records of energy use, storage, and disposal.

Human Welfare, Health and Safety

xvii) Human welfare, health and safety are further components of sustainability. Farming must be economically viable to be sustainable. The social and economic welfare of farmers, farm workers, and their communities depends upon it. Health and safety are also important concerns for those involved in farming operations. Due care and diligence is required at all times. With regard to agricultural workers, the ILO in collaboration with governments, employers and trade unions, has developed core conventions on labour including codes of practice for agriculture, which have not been specifically included in the indicators and practices.

xviii) Good practices related to human welfare, health and safety will include those that direct all farming practices to achieve an optimum balance between economic, environmental, and social goals; provide adequate household income and food security; adhere to safe work procedures with acceptable working hours and allowance for rest periods; instruct workers in the safe and efficient use of tools and machinery; pay reasonable wages and not exploit workers, especially women and children; and purchase inputs and other services from local merchants if possible.

Wildlife and Landscape

xix) Agricultural land accommodates a diverse range of animals, birds, insects, and plants. Much public concern about modern farming is directed at the loss of some of these species from the countryside because their habitats have been destroyed. The challenge is to manage and enhance wildlife habitats while keeping the farm business economically viable.

xx) Good practices related to wildlife and landscapes will include those that identify and conserve wildlife habitats and landscape features, such as isolated trees, on the farm; create, as far as possible, a diverse cropping pattern on the farm; minimize the impact of operations such as tillage and agrochemical use on wildlife; manage field margins to reduce noxious weeds and to encourage a diverse flora and fauna with beneficial species; manage water courses and wetlands to encourage wildlife and to prevent pollution; and monitor those species of plants and animals whose presence on the farm is evidence of good environmental practice.