CONSULTATIVE BOARD ON THE WORLD COCOA ECONOMY
Twentieth meeting
London, Monday, 14 September 2009 at 9.30 a.m.

BEST PRACTICES FOR THE COCOA, CHOCOLATE AND CONFECTIONERY INDUSTRY

NOTE BY THE SECRETARIAT:

The attached document has been submitted by Dr. Martin Gilmour for consideration by the Consultative Board at its 20th meeting, as agreed at the 19th meeting of the Board in June 2009.

NOTE BY DR MARTIN GILMOUR:

The following document from the International Confectionery Association (ICA) describes the specific Good Manufacturing Practices (GMP) for the Cocoa, Chocolate and Confectionery industry, which are essential to ensure sustainable consumption of cocoa containing products. While there are of course many other aspects to a sustainable cocoa economy and to sustainable consumption specifically, perhaps the minimum "entry-level" criteria which must be followed are the principles necessary to make safe products. There can be no question that the production of cocoa and chocolate products free from contamination of pathogens, foreign bodies, and residues and contaminants is of the utmost importance in promoting sustainable consumption. The following is a basic introduction to producing safe, wholesome cocoa and chocolate products and further detailed information on GMP in general food production can be found in the attached Further Reading list.
THE ICA CODE OF GOOD MANUFACTURING PRACTICE

SPECIFIC GMP FOR THE COCOA, CHOCOLATE AND CONFECTIONERY INDUSTRY

This booklet is available at the Secretariat of the

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1. **INTRODUCTION**

General Codes of Practice and General Principles of food hygiene have been established – for example, by the Codex Alimentarius. As outlined in this document, the main purposes were to protect the health of consumers and to ensure fair practices in the food trade, to promote coordination of work undertaken by governmental and non-governmental organisations and to initiate the preparation of draft standards and codes of practice with the help of appropriate organisations.

The present code of Good Manufacturing Practices deals with general aspects of hygiene and food safety as well as with specific aspects of the cocoa, chocolate and confectionery industry.

This document and the already issued "Code of Practice of the IOCCC" (IOCCC, 1991) based on HACCP, for the prevention of *Salmonella*, are complementary. These two documents should provide the necessary guidelines and adequate tools to guarantee the wholesomeness of the products manufactured.

Whereas the HACCP document focused on *Salmonella* as a recognised Public Health Hazard, the present document embraces microbiological as well as physical and chemical concerns.

This Code was established on the basis of existing documents such as those issued by the Codex Alimentarius (1983) or the Federal Register (1986). Further information can also be obtained from a draft "GMP for Cacao Products and Confectionery" prepared by the FDA (Anon., 1986) but which was never finalised as a specific document.

2. **CRITICAL CONTROL POINTS**

The FDA defines a Critical Point as a point in a food process where there is a high probability that improper control may cause, allow or contribute to a hazard or filth in the final food or decomposition of the food. Hazards could be of a microbiological, physical or chemical nature.

A Critical Point in a food process can be a location, practice or procedure. At such Critical Points preventive or control measures can be exercised to eliminate, minimize or reduce the hazards.

A careful hazard analysis of the process should be performed with a multidisciplinary team approach, which will identify the Critical Control Points (CCPs). Each manufacturer should identify the CCPs in the food processing chain in order to ensure food safety.
Once these are defined, limits for each CCP should be defined and a suitable way of monitoring these should be implemented.

Critical Control Points can be distinguished from Control Points where the first is related to a hazard and the latter to product adulteration or quality loss.

Based on the risk assessment, the CCPs therefore receive the highest priority for control.

The manufacturer should ensure that these procedures are performed, maintained and reviewed (see also chapter 2 of the HACCP document).

3. **BUILDING REQUIREMENTS**

3.1. Premises

Food premises should be of sound, weatherproof construction and maintained in good repair.

They should be suitable for the operations and process to be carried out in them: storage, processing, manufacture, packing, warehousing.

The perimeter should be free from any accumulation of machinery, equipment, waste or overgrown vegetation.

The premises should be secure against the ingress of all types of pests – birds, animals and insects. Windows should be fixed shut or be covered with suitable protective mesh to prevent ingress of pests and should have their sills sloped to prevent their being used as shelves. All externally opening doors should be close fitting and have automatic closure devices, plastic strip curtaining, double doors or air screens. All other openings should be sealed.

3.2. Services

The supply and distribution of services – air, water, power and drainage – should not allow dirt to accumulate or pose a contamination risk. All effluent and waste pipes should be connected to a sewage system large enough to carry peak flows and constructed to avoid contamination of potable water supplies.
3.3 **Layout**

All production areas should be laid out to allow for a suitable sequence of processing steps in order to maintain throughput efficiently and prevent cross-contamination. The design and layout of the raw bean area are of critical importance (see section 10.3) for the prevention of cross-contaminations.

4. **FOOD ROOM REQUIREMENTS**

4.1. **Food rooms**

Any room where ingredients and packaging that have been removed from their original wrapping materials, or semi-finished products are stored, conditioned or processed should be designated a food room.

Food rooms should be clearly defined and physically separated from other areas of the premises such as laboratory and maintenance (see HACCP document, chapter 5). Strict hygiene rules should apply at all times in such areas.

4.2. **Finishes**

Where appropriate, floors should be made from waterproof, non-absorbent, washable and sanitisable, non-slip and non-toxic material and should be sloped for drainage purpose.

Walls should be smooth and impervious, capable of being easily cleaned. The junctions between walls and floors and walls and ceilings should be coved and sealed.

Suspended ceilings are not recommended. If they are already in use, areas above suspended ceilings should also be accessible for cleaning and dust removal.

Floors, walls and ceilings should be regularly cleaned and condensation minimised to prevent mould growth.

4.3. **Temperature**

Where necessary, areas with specific temperature and humidity requirements for processing or storage should be fitted with suitable measuring devices and means of controlling the critical conditions.
4.4. Ventilation

Suitable means of ventilation should be present to handle airborne dust, fumes, vapour or excess heat in a safe manner.

Ventilation should be sufficient to prevent any build-up of condensation. Filtration systems, if included, should be accessible for inspection, cleaning and exchange. Care should be taken to site all air intake to ventilation systems away from drains, exhaust systems, unclean zones or fume-containing areas in order to prevent cross-contamination.

Lighting

Lighting should be suitable and sufficient for the process and operations being carried out.

General lighting levels should be 220 lux with 540 lux at points of inspection and where monitoring or sorting is taking place. A level of 110 lux is suitable for storage areas (recommendations of the Codex Alimentarius, 1983).

Light fixings as well as fire detection systems should be accessible for inspection, maintenance and cleaning.

All lights in food rooms should be protected to prevent any contamination with glass in case of breakage.

4.6. Washing Facilities

Suitable and separate washing facilities should be provided for personnel and equipment and be clearly identified as such. Hot and cold water or a single controlled-temperature supply should be provided.

For wash-hand basin, non-hand-operated taps are recommended. Reusable or multiple use towels should not be used!

5. EQUIPMENT REQUIREMENTS

5.1. General

All equipment, utensils and measuring devices that may have contact with food, directly or indirectly, should be made of materials that do not transmit toxic substances, odour, taste or foreign materials to the food. The materials should be non-absorbent and able to withstand the environment of their intended use and the action of food ingredients, cleaning compounds and sanitizing agents. The use of different materials in such a way that contact corrosion can occur should be avoided.
Wood and other materials that cannot be adequately cleaned and sanitized should be avoided except when their use would clearly not be a source of contamination.

Glassware, plastic containers or utensils should not be used in such a way that there is any risk of contamination of the products. Plastic should replace glass wherever possible.

Equipment and utensils used for inedible materials or waste should be identified as such (e.g. by colour coding).

5.2. Design and Installation

Surfaces not in direct contact with produce and/or equipment, such as covers, lids, etc., which could cause contamination of equipment should be so constructed that they can be kept in a clean, sanitary condition. Seams on food-contact surfaces should be smoothly finished so that no spaces exist where microbiological contamination or infestation can occur.

All processing and packaging equipment should be designed, installed and maintained so as to permit ready and thorough cleaning, e.g. it should be elevated from the floor and there should be enough space around it to allow for easy cleaning.

Cooling tunnels on processing lines should have access doors or other provisions to permit visual control and cleaning of the interior.

Dead spots, complex cross piping and complicated valve systems should be avoided.

Liquid handling equipment (for perishable foods) or equipment that requires wet cleaning should be constructed and installed so that it drains freely.

Open transport of product should be avoided. If that is not possible, pipes, cables or other installations that can collect dust, cause condensation or in any other way contaminate the product should not be placed above the product flow.

Equipment in which dusty ingredients are processed or which generate dusty materials should be equipped with dust control devices that collect and remove particulate matter from the processing area.

Storage tanks and hoppers should be adequately covered. Storage tanks for perishable bulk liquid ingredients should have filtered air-intake vents.

Cool surfaces in warm areas should be insulated to prevent any formation of condensate. Insulation should be kept in sound condition.
5.3. **Control Devices**

Measuring, regulating and/or recording equipment for parameters such as temperature, pressure, flow, etc., should be effective and of sufficient accuracy for its designated use. The calibration of such instruments should be checked and if necessary adjusted regularly, in particular when used at Critical Points. Each freezer and cold storage compartment used for storing or holding raw materials or products capable of supporting growth of micro-organisms should be fitted with a temperature measuring and recording device. This should be installed to show accurately the temperature within the compartment, and should be fitted with an automatic control for regulating or an automatic alarm system to indicate a significant temperature change. Metal detectors and other equipment for separation of foreign materials are considered as Critical Points and should be inspected.

6. **FOOD WASTE AND REWORK**

6.1. **Definitions**

Waste means product rejected owing to contamination or adulteration or of unknown history that renders it unsuitable for use as human food. Waste has to be disposed of.

Rework means clean, wholesome products (s) removed from processing for reasons other than insanitary conditions and which may be re-used as food after suitable reprocessing. Rework has to be considered as a Critical Control Point (see IOCCC, 1991; section 6.4). Rework, when stored or held, should be regarded as a raw material.

6.2. **Handling**

Waste and rework should be collected in separate, properly closed and clearly distinguishable containers and removed at least daily from the processing area and stored until disposal or reprocessing at allocated places.

Allocated, separate places for storage of rework should be kept clean and be covered, and suitable pest control has to be carried out to prevent pests from gaining access to the rework area.

Effective measures should be taken to prevent cross-contamination of rework and/or finished goods by waste.

When waste is transported it should not come in contact with raw materials, or semi-finished or finished product. A pest control programme should also be applied for waste.
Contamination of raw materials, other ingredients, rework or finished foods via equipment, containers or utensils used to convey, process, hold or store waste should be prevented.

7. **SUPPLY AND USE OF WATER, STEAM AND AIR**

7.1. **Water**

The plant should have an adequate supply of potable water corresponding to the latest edition of the “Guidelines for Drinking Water Quality” (WHO, 1984) or of the national legislation, or have the necessary facilities to treat raw water from different origin to the same standard (wells, river, recycled water, etc). Treatment, if applied, should be monitored continuously. Water should be protected against contamination during any intermediate storage and distribution through the plant.

Water used as an ingredient or for cleaning should be of potable quality. Water in water circuits that may come into contact with the product through defects in the structure, such as microleaks, should be of sound microbiological quality.

Water unfit for drinking (non-potable water or recycled water) can be used for the generation of steam, refrigeration, fire control and other similar purposes but one should be aware of the risks of cross-contamination. Water of this type should be conducted in separate, identifiable pipe systems without any cross-connections or any possibility of reflux into the potable water system.

7.2. **Steam**

Steam used directly in contact with food or food-contact surfaces should be food-grade and not contain any substance presenting a hazard to health.

7.3. **Air**

Process air that comes in contact with food or food-contact surfaces, such as injected air or transport air, should be food-grade. The use of compressed air for cleaning should be restricted. Air intake should be located in a clean environment.

8. **SANITARY OPERATIONS**

8.1 **Pest control**

Effective measures should be taken to exclude pests such as flying and crawling insects and rodents or birds from the processing area and to protect against contamination of food, food-contact surfaces and food packaging materials. Pest control should be preventive and should include monitoring, e.g. of buildings, and include an effective system of documentation.

Preventive measures such as fumigation and good housekeeping are important to prevent the entry or attraction of pests. Additional measures such as the installation of
hormone traps or electric fly killers, the use of insecticides or rodenticides (with precautions) and the organisation of a surveillance system will reinforce the preventive measures (see for example CCA, 1984).

8.2 Cleaning and Sanitization

Each factory should have a specific cleaning schedule with a formal cleaning plan for the specific zones, indicating what should be cleaned, the frequency of cleaning, the cleaning method and the responsibility for cleaning.

Wet cleaning of parts of equipment, moulds or utensils should be performed in separate rooms. Here, manual or automated techniques using water and detergents can be applied.

After cleaning and sanitization, if necessary, rinsing and immediate drying should take place.

Chocolate production is considered a dry operation and water should only be used if wet cleaning is absolutely required. It should only be applied to small areas at a time and complete and immediate drying should be ensured. Dry cleaning of floor and equipment will include scraping, brushing and vacuum treatment, followed by sanitizing for example with a food-grade, alcohol-based disinfectant or a strong hypochlorite solution.

All potentially dangerous chemicals such as cleaning chemicals and fumigants should be stored securely and in such a manner as to prevent the contamination of raw materials, products or the process environment.

No material should be used in production areas when a risk of tainting is expected.

8.3 Maintenance

If performed in an uncontrolled way, maintenance and/or repair work may lead to additional risks (see IOCCC, 1991: section 7.3).

In order to minimise such risks, maintenance work should be planned as far as possible and adequate precautionary measures should be taken: separation of repaired equipment or areas from the rest of the premises, control over personnel movements, storage of pieces of equipment and tools under hygienic conditions, etc.

Repaired equipment should be inspected, cleaned and disinfected or “cleaned” with product if no other alternative is possible (the product being discarded afterwards), before being used for production.

9. PERSONNEL

The plant management should take all reasonable measures and precautions to minimise the risk of contamination by human activity.
9.1 **Hygiene Training – Personal Cleanliness**

Managers should arrange for adequate and ongoing training of every food handler in the hygienic handling of food and personal hygiene, so that they understand the precautions necessary to prevent contamination of food.

A “code of hygienic practice for employees” provided by the company should be distributed to each new member during his/her induction period.

Training and instruction should also be provided for temporary employees and outside contractors (technical services, cleaning, etc).

Visitors should be instructed on basic hygiene rules prior to entry to production areas.

9.2 **Disease Control, Medical Examination**

Personnel should be instructed to report poor health conditions such as illness, open lesions, including boils, sores or infected wounds, or any other abnormal source of microbial contamination by which there is a reasonable possibility to contaminate food, food-contact surfaces, or food-packaging materials. Any person who, by medical examination or supervisory observation, is shown to have, or appears to have the signs mentioned above should be excluded from any operations that may be expected to result in contamination until the condition is corrected.

9.3 **Cleaning of Hands**

Hands should be washed thoroughly (and sanitized if necessary to protect against contamination with undesirable micro-organisms) in an adequate handwashing facility before starting work, after toilet use, after each absence from the work station, and at any other time when the hands may have become soiled or contaminated.

9.4 **Protective Garments**

Protective garments should be clean and conform as closely as possible to the following guidelines:-

- Garments should be preferably of different colours for clean and unclean zones (see HACCP document, section 3.1).
- Hats or head covering of a suitable type should be worn by all personnel; any hair not completely covered by a hat or head covering should be contained within a fine mesh hair net.
- Protective garments including shoes worn in food rooms should be stored separately from outside clothing and should not be worn outside, e.g. travelling to and from work.
9.5 Jewellery and Other Objects

In production areas, in addition to wearing protective clothing, employees should present themselves in a clean and tidy manner and free from any possible hazard that could spread bacteria or foreign bodies into the product, i.e.:-

- no insecure jewellery to be worn;
- no coins or small personal effects to be carried loose in protective clothing pockets (no outside pockets);
- no handling of money in the production area.

9.6 Gloves

Gloves, if used in the handling of food products, should be maintained in a sound, clean and sanitary condition. The wearing of gloves should not exempt the operator from the requirements in paragraph 9.3.

9.7 Personal Behaviour

The use of tobacco or chewing gum, eating and drinking are strictly forbidden in food rooms, but allowed in prescribed areas. Taste testing is performed in defined areas.

9.8 Outside Contractors

All persons entering the food rooms, including outside contractors, should comply with the same hygiene requirements as regular staff.

9.9 Supervision

Responsibility for ensuring compliance by all personnel with requirements 9.1 to 9.8 should be specifically allocated to competent supervisory personnel.

10. PRODUCTION

10.1 Raw Material Specifications

For the classification of different raw materials, refer to chapter 6 of the HACCP document (IOCCC, 1991).

Raw materials and packaging materials to be used in processing should be:

- Clearly defined in detailed, written purchase specifications;
- Clearly identified by name, lot number, receiving number or laboratory control number;
- Accounted for by inventory records;
- Received under supplier’s guarantee and/or periodically sampled to monitor their quality.
10.2 Raw Materials Storage and Handling

The manufacturer should ensure that raw materials of agricultural origin such as raw cocoa beans, raw milk or raw nuts are adequately heat-processed to destroy *Salmonella*. For pre-processed raw materials such as gelatine, egg products, lecithin, coconuts, etc., a careful choice and discussions with the supplier, as well as analytical verifications, should ensure raw materials of good quality, corresponding to microbiological and chemical specifications.

The manufacturer should ensure that nut meats, cocoa beans, raisins, spices and other raw materials, as well as rework, susceptible to infestation by animals, birds, insects, vermin, micro-organisms or extraneous materials comply with current legislation.

Raw materials should be held in their original containers or in containers designed and constructed to prevent raw material contamination. Raw materials and packaging materials should be held under such conditions of temperature and relative humidity and in such a manner as to prevent their adulteration by contamination or decomposition.

Frozen materials susceptible to microbiological growth should be stored at a temperature of -18 °C or below.

Liquid mixtures containing perishable materials capable of supporting the growth of pathogenic micro-organisms should be processed prior to use in such a way as to destroy these micro-organisms, or should be held in such a manner as to preclude the growth of these organisms.

Raw materials should be held in such a manner as to prevent microbial growth or any other direct or indirect contamination.

10.3 Prevention of Cross-contamination

Effective measures should be taken to prevent contamination of food material by direct or indirect contact with raw materials and/or environment.

Bean cleaning and roasting equipment should be adequately isolated and partitioned off from other operations to prevent airborne contamination of the roasted product. Shells, dust and other residue particles from unprocessed raw materials such as nuts, etc., resulting from cracking operations should be handled and held in such a manner as to prevent product contamination.

Dust-extraction equipment should be used wherever necessary to prevent cross contamination.

Implements and utensils should be clearly identified, e.g. by colour coding, for use in specific plant areas. They should be properly stored and used to prevent contamination of product and other equipment.
Traffic, both vehicular and pedestrian, within the plant should be controlled to prevent unnecessary cross-traffic between raw material and processing areas.

Appropriate measures should be taken to prevent the outside of containers from contaminating the product. For example bags of raw materials should be cleaned off before emptying and broken or damaged containers should be discarded.

Any products that are not wrapped should be protected by appropriate measures.

If there is any likelihood of cross contamination, hands should be washed thoroughly between handling products at different stages of processing.

10.4 Processing

Frozen ingredients should be defrosted in a sanitary manner and by such methods that their wholesomeness is not adversely affected.

Processes intended to pasteurize or otherwise treat materials to destroy pathogenic micro-organisms should be validated to be adequate under the conditions of manufacture for a given product (see also chapter 7 of the HACCP document).

For incoming raw materials, semi-finished products and rework, suitable equipment such as filters, sieves, magnets, electronic metal detectors, and other effective devices should be utilised where necessary to prevent the inclusion of metal or other extraneous material in the finished product.

10.5 Production Records and Lot Identification

Records should be kept confirming the examination of raw materials, packaging materials and finished products. Supplier guarantees or certifications that verify compliance with regulations, customer specifications and legislative guidelines should also be retained.

Records should be kept for all production and processing stages that are intended to pasteurize or sterilize materials (Critical Control Points, see IOCCC, 1991, chapter 6). They should contain sufficient information to permit an evaluation of the process should a problem arise.

Records should be maintained that facilitate the segregation of specific food lots that may have become contaminated or otherwise unfit for their intended use.

The manufacturer should retain all records for a period of time not shorter than the shelf life of the products concerned or as long as required by law/legislation.

The manufacturer should have a written procedure, capable of immediate implementation, for the complete and rapid recall of any product from the market, or any warehousing or storage system.
11. REFERENCES


FURTHER READING

Other documents on GMP available from CAOBISCO:


The ICA Code of Hygiene Practice Based on HACCP for the Prevention of Salmonella Contamination in Cocoa, Chocolate and Confectionery Products (1st edition 1991)

Examples of the Application of HACCP (revision 1 August 1999)

Further reading and information on GMP for the food industry:

International Organisation for Standardization

International Standards for Business, Government, and Society, including ISO 9001 - Quality management systems - Requirements, and ISO 22000 - Food safety management systems - Requirements for any organization in the food chain.

http://www.iso.org/iso/store.htm

BSI Publicly Available Specification 220 Food Safety

Publicly Available Specification (PAS) 220:2008 - For prerequisite programmes to assist in controlling food safety risks within the manufacturing processes of international food supply chains


Safe Quality Food Institute Certification

The SQF (Safe Quality Food) Program is a leading, global food safety and quality certification program and management system designed to meet the needs of buyers and suppliers worldwide. It provides independent certification that a supplier's food safety and quality management system complies with international and domestic food safety regulations

http://www.sqfi.com
BRC Global Standards

The BRC Global Standards are a leading global product safety and quality certification program used throughout the world by over 14,000 certificated suppliers in over 90 countries

http://www.brcglobalstandards.com

International Featured Standards - IFS Food 5

The International Featured Standard (IFS) is developed for all type of retailers and for wholesalers with similar activities (e.g. cash and carry). They all have to ensure the safety of their “own branded” products they sell. IFS helps to comply with all legal safety requirements and gives common and transparent standards to the all concerned suppliers as well as a concrete and strong answer to the high safety expectations of customers. The IFS Food is a Standard for auditing retailer and wholesaler branded food product suppliers and only concerns food processing companies or companies that pack loose food products.

http://www.ifsonline.eu/index.php?SID=b69591114ba5f42577f5fb963381cc49&page=home&content=public_content&desc=ifs_standards_food_5

Global Food Safety Initiative

The Global Food Safety Initiative (GFSI) co-ordinated by CIES - The Food Business Forum, was launched in May 2000, with the mission to: Continuous improvement in food safety management systems to ensure confidence in the delivery of safe food to consumers

http://www.ciesnet.com/2-wwedo/2.2-programmes/2.2.foodsafety.gfsi.asp

Codex Alimentarius (FAO/WHO Food Standards)

The Codex Alimentarius Commission was created in 1963 by FAO and WHO to develop food standards, guidelines and related texts such as codes of practice under the Joint FAO/WHO Food Standards Programme. The main purposes of this Programme are protecting health of the consumers and ensuring fair trade practices in the food trade, and promoting coordination of all food standards work undertaken by international governmental and non-governmental organizations.

http://www.codexalimentarius.net/web/index_en.jsp