



## FFTC Agricultural Policy Platform (FFTC-AP)

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### **FOOD SAFETY AND TRACEABILITY OF AGRICULTURAL PRODUCTS**

Chan-Chiung Liu  
Department of Food Science, NPUST, Pingtung, Taiwan  
e-mail: [ccliu@mail.npust.edu.tw](mailto:ccliu@mail.npust.edu.tw)

#### **ABSTRACT**

*"Traceability/Good Agricultural Product", better known as TAP system, is the traceability system of agricultural products in Taiwan. It mandates participants to record all stages of production, processing, distribution and sales, and make it public once the product is certified. This fully empowers consumers their right to know, help to eliminate the public's worries and doubts about food safety. The framework of the TAP system consists of regulations and operating standards, platform of information management and traceability, and unbiased third-party certification. The fundamental parts of the TAP system are Taiwan's Good Agricultural Practices, TGAP. A typical TGAP comprises production flowchart, risk management list, self-checklist, cultivation and pest control agenda, and record keeping booklet. There are eight core values of the TAP system that are emphasized by the agricultural authority, which in general are consistent with all other global GAPs. The TAP system not only establishes the very basic protection to food safety, but also brings several benefits to the producers. There are currently 2425 TAP certified units comprised of around 10,000 total producers that only make up a small percentage of Taiwan's agricultural sector. Educating the consumers to have better understanding about the TAP system, along with further extension services to provide more incentives to producers, will certainly encourage their compliance with regulations to provide safe and secure food. Thus the traceability system would help to develop a virtuous cycle of agricultural production.*

**Keywords:** Traceability/Good Agricultural Product (TAP), Taiwan good agricultural practice (TGAP), Traceability, Food safety

#### **WHAT IS THE TAP SYSTEM AND HOW IT BEGAN**

##### **Launch of TAP products**

Starting from the second half of 2007, consumers in Taiwan have begun to notice a small green tag (called TAP label, Figure 1) on some vegetables, fruits, and fish packaging bags on the market. TAP stands for Taiwan/Traceability Agricultural Product. These specially labeled agricultural products (example shown in Figure 2) usually appeared on "TAP agricultural products counters" in the chained supermarkets, with slightly higher price tags compared to similar products without labels. Most people were not aware about what they mean, on these new grass-green, two-way heart-shaped arrows. Because there were no such labeled products in the general traditional markets, not many people paid attention to know them further.



Figure 1. Taiwan/Traceability Agricultural Product TAP logo.



Figure 2. Complete TAP product label on commercial product.

However, if we would take the time to study this small TAP label, we shall find that the information contained in this stamp is actually plentiful. When we hop onto the web site of "Taiwan/Traceability Agricultural Product Information Network", and type in "traceability code" of a designated product, we will find out where it was produced by which farmer, and all the planting or breeding processes would be revealed as well, including the time of harvesting or slaughtering, packaging and shipping. More importantly, there are also information related to the analysis results of pesticide or drug residues. All this information is transparent to the general public and can be seen at a glance. This information is somehow like a resume that records our birth, education, and work histories, so we could call it the "production and sales resume" of agricultural products.

## What is TAP system?

"Traceability/Good Agricultural Product", or "Production History" which might be more understandable to the general public, was originally derived from the term "Food Traceability System" used in the European Union. It means that the production of primary agricultural, livestock, or fishery products, including their processed forms, could be traced to the origins. The history of all products and their processed forms at all stages of production, processing, distribution and sales all have records for consumers to inquire. This approach fully empowers the consumers of their right to know, so it could eliminate the public's worries and doubts about immoral foods, or foods that contain no information on how they are made of.

As to the traceability of food sources, its earliest appearance was during the second mad cow crisis, scientifically known as *bovine spongiform encephalopathy* (BSE), in Europe in 1996. The EU decided to introduce a production tracing system as a countermeasure. Later in Japan, also because of the mad cow disease, legislation was established to launch a beef production tracing system in 2003. In the past years, including the United States, New Zealand, Australia, South Korea, Thailand, India, etc., had gradually picked up the pace in promoting the traceability of agricultural products. China has also prioritized the establishment of traceability system in different regions since 2004.

## Framework of TAP system

Although there are differences among the traceability systems of various countries, the framework generally consists of the following four (4) elements:

1. Complete regulations and operating standards - including legal basis for enforcement, penalties for violations, specifications to be observed for production and processing operations, criteria for certification, and labelling details for certified products. In Taiwan, there is the "Agricultural Production and Certification Act" (including all sub-laws and implementing rules), at the regulatory level; and "Taiwan Good Agricultural Practice" (TGAP) as the production standards.
2. Information management and traceability platform - Food traceability means vesting the consumers the right to know. "Information available on demand" just cannot satisfy the public. Therefore, a publicly trustworthy platform needs to be built as an entry point for information retrieval and management. In Taiwan, there is "Taiwan/Traceability Agricultural Product Information Network" (<https://taft.coa.gov.tw/>).
3. Independent and unbiased third-party certification - just like buying a helmet, we need to recognize "Ⓢ" mark, agricultural products need to be certified by the certification body before they could stick that little green tag on their products. Currently there are 14 active certification bodies, all have been strictly modulated by the Council of Agriculture (COA) and Taiwan Accreditation Foundation (TAF), for their professional competence. The accreditation scheme follows ISO/IEC 17065 Standards: Conformity Assessments - Requirements for bodies certifying products, processes, and services.
4. Other supporting measures - The substantial subsidies for the farmers by the authority, or the supporting incentives such as extensive counseling and expanding the sales channels, will greatly increase the farmers' willingness to participate in TAP system.

Agricultural producers (including crops, livestock, poultry, and fish) can apply for TAP certification in either individual or group form. Individual certification is executed on single farmer (or a legal entity), while group certification is carried out on a listed agricultural production and marketing group which produce the same product. There will be only one certificate for a group certification. So when we count the agricultural producers that are TAP certified, there will be "unit" representing numbers of TAP certificates issued; and "producer" designating total number of farmers participated in TAP system.

## **Instituting and promoting history of the TAP system**

Taiwan started instituting the TAP system as early as 2004, first promoting within some selected agricultural production and marketing groups, counseling farmers to record field works that are related to product safety and quality. After a few years of pioneering field tests, COA officially announced the enactment of the TAP system, which is officiated by "Agricultural Production and Certification Act" (including all sub-laws and implementing rules associated with it). The TAP system has been designed as a voluntary option for agricultural producers, and the government employed subsidizing incentives to encourage the participation. Currently COA adopts several principles and selects appropriate products to continuously promote TAP system, including those required by the exporting country, guaranteed marketing with fair selling prices, foods with potential safety hazards (like beef with mad cow disease).

## **INSIDE TAP SYSTEM**

### **Taiwan's Good Agricultural Practice or TGAP**

Good Agricultural Practice, abbreviated as GAP, is generally regarded as "a set of principles, regulations and technical recommendations applicable to production, processing and transport of agricultural products, addressing human health care, environment protection and improvement of worker conditions and their families" (Izquierd *et al.* 2007). Usually these guidelines would be drafted by either the agricultural authority or organizations of special interests, such as retailers' association.

Advanced countries in the world all have developed GAPs suitable for their particular agricultural development and in line with international trends, such as in Japan, originally known as Japan GAP, later changed to ASIAGAP, and now has been successfully recognized by GFSI (Global Food Safety Initiatives). Some global food corporations, or large international food retailers' associations, also have their own special guidelines drawn, in order to regulate the obligations of its suppliers. The most well-known one would be GlobalGAP, its board is made up of elected producer and retailer representatives. In Taiwan, the Council of Agriculture invited all parties to set up TGAPs (T stands for Taiwan), which made up the standards for the implementation and certification, regarding the production, processing and transport of agricultural products in Taiwan.

Unfortunately, COA has never compiled to these TGAPs into English versions. A typical TGAP for crop is used as an example for elucidation. It contains:

1. Operation flow chart for production and shipping – A flowchart that links from farm preparation such as field ploughing and soil improvement, through fertilization, cultivating, weeding, irrigation, pest and disease control, until harvesting, grading, packaging and shipping. This is the very basics for the production of that crop;
2. Risk management list for production and shipping – It lists all potential risks that could be associated in production and shipping, and proposes some response measures that could eliminate or alleviate those hazards or causes, finally vouchers and records to keep for traceability establishment. This risk management list brings Hazard Analysis and Critical Control Point (HACCP) concepts into primary agricultural production;
3. Self-Checklist for production and shipping – Includes all the operations step-by-step from the very beginning to the shipping out of products. More importantly, there are items and frequencies to be self-checked for each step. It serves as a reminder for the farmer before applying certification;

4. Timetable for cultivation and pest control – Seasonal (if any) activities of farming management, and the timing spot for recommended measures of pest control. It lists all specific pests and diseases that commonly occurred on this particular crop. Along with the previous content (self-checklist for production and shipping), serve as a standard operation procedure for this crop production. The essential part of this content would be the recommended control measures for that crop, i.e., permissible (recommended) pesticides and their dosages for conventional crop, or other non-synthesized-chemical based prevention methods for organic crop; and
5. Production record keeping booklet – Includes basic information of farmer and farmland, purchase records of production supplies, fertilizers and pest control materials (pesticides or other prevention control supplies), working diary, inspection reports, and sticking plate for all supplies' vouchers. This is the record to be thoroughly checked during certification, and the information therein must be uploaded to the designated TAP database and made public once certified.

The above was taking a crop's TGAP for explaining, there will certainly be different formats or contents for the TGAPs of livestock, poultry, or fish (aquaculture fish).

### **Core values of Taiwan/Traceability Agricultural Product System**

There are eight (8) core values of TAP system emphasized by COA, namely:

1. Traceable product – Product traceability is the process of maintaining records of all materials and parts from purchasing to finished goods where a unique number identify a part, batch, or a finished product. With a trace code on the little green tag, consumer is able to know how, when, and where this agricultural product was made. All elements constructing the TAP system were regulated and maintained by COA of Taiwan;
2. Systematic production via SOP – TGAP of individual crop could serve as a guide of production, so it is a good self-teaching manual for a new farmer, and serve as standardized doctrines among producers' group;
3. Friendly to environment – People usually said that Taiwan ranks number 1 in pesticide use per hectare of farmland. Although it is not exactly true, yet Taiwan is still among the top ranking in that category. (FAOSTAT, <http://www.fao.org/faostat/en/#data/EP/visualize>). Over fertilizing and abusive use of agricultural chemicals (pesticides, fungicides, herbicides, and insecticides) certainly pose irrecoverable damage to our environment and ecosystem. All GAPs across the world aim to reduce the harms that farming done to our environment;
4. Crop health management – Crop health management is the science and practice of understanding and eliminating the succession of biotic and abiotic factors that limit plants from achieving their full genetic potential as crops, ornamentals, timber trees, or other uses. This concept is similar but broader than Integrated Pest Management (IPM) (Cook 2012);
5. Third-party certification –Third-party certification means that an independent organization has reviewed the manufacturing/production process of a product and has independently determined that the final product complies with specific standards (i.e. crop's TGAP) for safety, quality or performance. This review typically includes comprehensive document reviews, on-site facility auditing, product sampling and analysis, etc. TAP certifications are executed by 14 active certification bodies (CB) nationwide; each of them must be continuously accredited by Council of Agriculture, as well as by Taiwan Accreditation Foundation.;

6. Animal welfare – Although animals (livestock, poultry, and fish) are being raised for food, they still deserve their rights. According to the World Organization for Animal Health (OIE) *Terrestrial Code*, “animal welfare means the physical and mental state of an animal in relation to the conditions in which it lives and dies”. The OIE guiding principles on animal welfare highlighted the universally recognized “Five Freedoms”, to describe the right to welfare of animals under human control. According to this concept, an animal’s primary welfare can be met by providing freedom from hunger, malnutrition and thirst; freedom from fear and distress; freedom from physical and thermal discomfort; freedom from pain, injury and disease; and last but not least freedom to express normal patterns of behavior. (OIE, <http://www.oie.int/en/animal-welfare/animal-welfare-at-a-glance/>);
7. Transparent information – All the information regarding the production, certification, and inspection, shall be available and open to the general public. All this information was uploaded by the producer and CB, to the central database managed by Government. COA, TAF, along with existing CBs, cooperate to keep this information liable and updated. This core value presents a major distinction with other general traceability systems, since transparency to all general public might not be mandated; and
8. Domestic freshness – TAP products, or TAP certified products, can exclusively be produced inside Taiwan's premises. These products bear relatively low food mileage, and the freshness should be better maintained compared to imported ones.

## **FOOD SAFETY AND TAP SYSTEM**

“From farm to table” is such a catchy phrase that everyone must have heard of. Indeed, traceability helps to establish the fundamentals of food safety scheme. It is mandated that all foods on the market should be basically safe, so the establishment of traceability system allows suppliers at all stages of the food supply chain, to be responsible for providing safe goods to downstream buyers; otherwise they must bear their own accountability. Providing safe agricultural products or food to downstream consumers or purchasers, is the obligation of suppliers; and the government's responsibility is to institute appropriate food safety regulations and systems, and to implement them. TAP or agricultural product traceability system, is far more than a sheer traceability system, on-site auditing as well as product inspection and analysis (pesticide residue, animal drug residue, heavy metals, etc.) undeniably enhance the trustworthiness of TAP products.

### **Protection to consumers**

All TAP products appeared on the market have passed the rigorous verification procedures by the CBs. A CB must not only be strictly evaluated and accredited by the authority, but also facing severe administrative penalties and liability when failed to execute its due diligence. A small green tag means that this CB has already gone to the farmer's production site for you, to confirm whether the farmers' records are authentic, whether they are in compliance with the specifications, and the product inspection is completed to verify its safety.

In the event of any food safety incident, the TAP system could clarify the scope of damage and responsibility immediately, conduct source management to prevent its spread-out, and enforce legal procedures to regulate product removal, recall, and compensation. Check-up at all levels will ensure the safety and right to know for consumers.

## Benefits to producers

Besides the food safety protection to consumers, there also exist at least these following benefits to producers:

1. Separation of production areas - Many consumers agree upon that the quality of agricultural products in specific areas are just superior to others, and they are willing to pay higher prices for them, such as pomelo of Madou, rice of Chihshang, etc. The TAP product information includes the place of origin, and since it was certified, the proof should be authentic;
2. Reducing risk and relieving legal liability – Without a trustworthy traceability system, single food safety incident might take down the entire industry. TAP system and its records could effectively clarify the liable party, manage risk, and thus reduce the potential harm to the producers; and
3. Improve the efficiency of agricultural operations - The records of whole production course can help producers to look at the overall input of materials and labor, so to achieve better understanding of management performance when compared with their revenue.

## Current TAP progress

The TAP system has been instituted for 12 years (from 2007 till 2019), yet its development cannot be reckoned as a great success. There were about 1,100 TAP certified units at the end of 2008, only grew to 2,425 total units, with approximately 10,000 producers in April 2019 (Table 1). The Center for Agricultural and Aquacultural Inspection and Certification (CAAPIC), NPUST, is among the first few CBs accredited by COA and TOF, and can execute the TAP certifications on crops, fishes, and their processed products. There are currently eight (8) qualified TAP auditors working full-time. The work performance is listed in Table 2. CAAPIC has been performing strongly in TAP certified fish products, due to the fact that Pingtung county is a major aquacultural base, particularly for saltwater fishes of high economic values. Aside from being an ISO/IEC 17065 accredited CB, CAAPIC is also an ISO/IEC 17025 certified laboratory, which means product analyses can be executed along with field auditing. There are other professional services could be provided to the producers that would make CAAPIC desirable choice for the agricultural producers.

Table 1. TAP certified producers in each category<sup>a</sup>

	Agricultural (Crop)	Aquacultural (Fish)	Livestock Animal	Poultry	Processed	Total
Units <sup>b</sup>	1364	625	178	124	134	2425
Producers <sup>c</sup>	8834	719	258	124	134	10069

<sup>a</sup>Data was retrieved from Taiwan/Traceability Agricultural Product Information Network (<https://taft.coa.gov.tw/rsm/passorgandfarmer.aspx>), accessed April 28, 2019.

<sup>b</sup>There are 2 certification modes in TAP, i.e., individual certification (single producer) and group certification (producer group as an application entity). "Units" represents the total numbers of entities certified.

<sup>c</sup>"Producers" signifies the overall numbers of agricultural producers, including all members included in group certification.

Table 2. Clienteles of CAAPIC, NPUST in each category<sup>a</sup>

	Agricultural (Crop)	Aquacultural (Fish)	Livestock Animal	Poultry	Processed	Total
Units <sup>b</sup>	140	237	---	---	10	382
Producers <sup>c</sup>	805	443	---	---	10	1258

<sup>a</sup>CAAPIC of NPUST is only accredited to perform agricultural and aquacultural certifications, not including livestock nor poultry.

To successfully promote TAP system, the first priority would be educating consumers to purchase TAP products, by calling on their health awareness and environmental conciseness. That will certainly give producers incentives and pressures, encourage their compliance with regulations to provide safe and secure food. A virtuous cycle of agricultural production, i.e., worthy price for good product, would certainly award farmers and make them willing to perform better. Every possible measure should be considered in order to increase the incentive of participation, accelerate the promotion of TAP system.

## CONCLUSION

Every time those sensational headlines such as toxic grouper, deadly milk powder, carcinogenic vegetable, etc., appeared in the newspapers or magazines, not only do they seriously hurt consumers' confidence in domestic agricultural products, the producers also take a great hit, causing the industry to shrink or even collapse. Food safety has become a persistent global concern. Most Taiwanese regard our own society as a progressive and prosperous society, people would undoubtedly pay more attention to food safety. The ever-increasing food safety incidents make consumers want to have clear information about the source of food and its related history. Agricultural authority of Taiwan did respond to this global trend of food traceability quite early in time, yet the progress of implementing to every single farmer are far from being satisfactory. At this stage, The TAP AP system along with its TGAP standards are only valid in Taiwan, has not yet gained the acceptance from our major exporting markets. COA has been trying to achieve the global recognition of TGAP. Whether TAP system could succeed or not, depends on the consumers rather than the Government. Public trust and encouragement will facilitate the broader implementation of the TAP system, to help achieving the goal of building a safer food environment, freeing Taiwan consumers from doubt and anxiety when choosing food.

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