

# The Impact of Modern Agriculture on Food Safety

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## Abstract

The rapid development of modern agriculture has had a profound impact on food safety. With the continuous advancement of technology and changes in agricultural production methods, modern agriculture can produce more food more efficiently, but it also brings a series of food safety issues. These issues include pesticide residues, veterinary drug residues, genetically modified foods, water and soil pollution, and problems in the breeding industry. These problems directly affect people's health and life safety. This article studies and analyzes the impact of modern agriculture on food safety, explores the problems and challenges existing in modern agriculture, and proposes some solutions to ensure food safety. These solutions include strengthening regulation, promoting green agriculture, adopting biotechnology, and enhancing consumer education. By taking these measures, we can better protect the rights and health of consumers and contribute to the realization of sustainable agricultural development.

## Keywords

Modern agriculture, food safety, genetically modified foods, water and soil pollution regulation, green agriculture

## 1. Introduction

With the continuous growth of the world's population and the rapid development of the economy, food safety has become an increasingly important concern. The rapid development of modern agriculture provides people with more food, but it also brings a series of food safety issues. Problems such as pesticide residues, veterinary drug residues, genetically modified foods, and water and soil pollution pose potential threats to people's health [1]. In order to ensure food safety, it is necessary to conduct in-depth research on the development of modern agriculture, explore its impact on food safety, and propose solutions. This article studies and analyzes the impact of modern agriculture on food safety, explores the problems and challenges existing in modern agriculture, and proposes some solutions to ensure food safety [2]. Firstly, this article introduces the characteristics of modern agriculture and its impact on food production, and then explores the challenges that modern agriculture poses to food safety, and elaborates on the food safety issues that exist in modern agriculture in detail. Based on this, the article proposes some solutions, including strengthening regulation, promoting green agriculture, adopting biotechnology, and enhancing consumer education, to provide effective measures and recommendations for ensuring food safety.

## 2. Development of Modern Agriculture and Food Safety

The rapid development of modern agriculture has provided people with more, cheaper and more abundant food, but it has also brought a series of food safety issues. The development of modern agriculture has had a profound impact and challenge on food safety. To ensure food safety, it is necessary to strengthen supervision and management, improve relevant laws and regulations, guide farmers to adopt safer production methods and technologies, and promote sustainable agricultural development. At the same time, consumers should also strengthen their self-protection awareness, choose safe and healthy food, and avoid eating unsafe food.

### 2.1 Characteristics of modern agriculture

Modern agriculture is characterized by high technology content, high production efficiency, and high resource utili-

zation efficiency. With the development of agricultural technology, modern agriculture has adopted a series of high-tech means, such as genetic engineering, biotechnology, new fertilizers, advanced machinery, etc., which have greatly improved the efficiency of agricultural production. In addition, modern agriculture also employs modern management methods, such as full-process traceability system, production standardization, informatization, etc., which have improved the management level of agricultural production. Therefore, modern agriculture can not only increase the yield and quality of agricultural products but also reduce production costs and provide people with more abundant agricultural products.

## **2.2 Challenges to food safety posed by modern agriculture**

The development of modern agriculture has brought many challenges to food safety. Firstly, the excessive use of chemical pesticides and veterinary drugs has led to risks to the environment and human health. Pesticide and veterinary drug residues in agricultural products have become a global problem, and these residues may have chronic toxic effects on humans, increasing the risk of diseases such as cancer, allergies, and neurotoxicity.

Secondly, the production methods of modern agriculture also pose challenges to food safety. Traditional natural agriculture uses natural methods such as crop rotation and organic fertilizers to produce natural and safe agricultural products [3]. However, the large-scale planting, breeding, and use of chemicals in modern agriculture may lead to the rapid spread of diseases and pests. Moreover, some breeding methods in modern agriculture may cause the spread of animal diseases, such as avian flu and African swine fever.

In addition, the intensive production and commercial operation of modern agriculture also increase the risk of food safety. Large-scale agricultural production often requires a large amount of input and rapid turnover, which can lead to some unscrupulous businesses using illegal additives, adulterating impurities, and other means to pursue economic benefits. These illegal activities put food safety at greater risk.

## **3. Food Safety Issues in Modern Agriculture**

Modern agriculture is an important part of the modernization process and plays a crucial role in food production and supply. However, modern agriculture also faces a series of food safety issues, such as pesticide residues, veterinary drug residues, genetically modified foods, water and soil pollution, and livestock farming problems.

### **3.1 Pesticide Residue**

The use of pesticides in modern agriculture can effectively control pests and diseases and improve crop yields, but it also brings potential food safety problems. Some pesticides are toxic to humans and can cause chronic toxicity, increasing the risk of diseases such as cancer, allergies, and neurotoxicity. Therefore, countries have strict regulations on pesticide use to ensure its safety. However, the problem of pesticide residue still exists in modern agricultural production. On the one hand, some unscrupulous businesses use illegal pesticides and exceed the pesticide usage limit. On the other hand, improper and non-standard use of pesticides leads to the problem of pesticide residue [4]. These pesticide residues may affect human health and pose a hidden danger to food safety.

To reduce the problem of pesticide residue, the following measures can be taken:

(1) Strengthen the management of pesticide use. The use of pesticides must comply with national and local laws and regulations, strictly follow the instructions for use of pesticides, and comply with regulations on safe use of time, dosage, and methods.

(2) Regularly test pesticide residues in agricultural products. Food and drug regulatory authorities at all levels should regularly sample agricultural products for pesticide residues, promptly notify and handle agricultural products that exceed the standard.

(3) Promote green agricultural technologies. Green agricultural technologies include organic agriculture, biological pesticides, agricultural ecological engineering, etc., which can reduce dependence on pesticides and ensure the quality and safety of agricultural products.

### **3.2 Residue of Veterinary Drugs**

Residue of veterinary drugs refers to the potential food safety problem caused by drugs used in animal production, such as growth hormones, antibiotics, etc., that remain in the animal's body and enter the human body after consumption. In modern animal husbandry, the use of veterinary drugs has become a common practice to ensure the health and production of livestock and poultry. Residues of veterinary drugs are mainly found in meat, eggs, and dairy products. The use of veterinary drugs can cause drug residues in animal bodies, which can then transfer to animal products such as blood, tissues, and milk. If these products are directly consumed without proper processing, they may have chronic toxicity effects on human health.

To reduce the problem of veterinary drug residues, the following measures can be taken:

(1) Strengthen the management of veterinary drug use. The use of drugs on animals must comply with relevant national and local laws and regulations, strictly follow the instructions for use, and comply with the rules for safe use of time, dosage, methods, etc.

(2) Establish a veterinary drug residue detection system. Food and drug regulatory authorities at all levels should regularly sample livestock and poultry products to detect veterinary drug residues, and promptly report and deal with products that exceed the standards [5].

(3) Promote healthy breeding technologies. Healthy breeding technologies include the selection and breeding of excellent livestock and poultry, the use of high-quality feed, and the replacement of chemical drugs with biological products. These technologies can reduce reliance on veterinary drugs and ensure the quality and safety of livestock and poultry products.

### 3.3 Genetically Modified Food

Genetically modified (GM) food refers to crops or animals whose genomes have been altered by humans to achieve better traits or performance. GM technology can improve crop resistance to diseases and pests, increase yield, and enhance the productivity and disease resistance of livestock. It is an important component of modern agricultural technology. However, GM food also faces food safety issues. Currently, there is still some controversy surrounding the safety of GM food. Long-term effects of GM food have not been fully verified and there may be potential risks such as allergies and antibiotic resistance.

To address the food safety issues related to GM food, the following measures can be taken:

(1) Strengthen the safety evaluation of GM food. Safety evaluation work should be strengthened for GM food to ensure that it poses no potential harm to human health.

(2) Establish a labeling system for GM food. A labeling system for GM food should be established so that consumers can identify GM food.

(3) Strengthen consumer education on food safety. Public education on food safety issues related to GM food should be enhanced to enable consumers to better understand the relevant knowledge of GM food.

### 3.4 Water and Soil Pollution

In modern agricultural production, a large amount of chemical substances such as fertilizers and pesticides are used, which may cause pollution to land and water resources during their use. Polluted soil and water resources may lead to harmful substances remaining in food, thereby endangering human health. Water and soil pollution is one of the common food safety problems in modern agriculture.

To address the problem of water and soil pollution, the following measures can be taken:

(1) Strengthen the management of agricultural chemicals such as fertilizers and pesticides. Agricultural chemical management should be strengthened, and the types and quantities of agricultural chemicals used should be strictly controlled to avoid excessive use of agricultural chemicals leading to environmental pollution.

(2) Promote green agricultural production methods. Green agricultural production methods include organic farming, ecological agriculture, etc., which can reduce dependence on chemical pesticides and fertilizers, and avoid the occurrence of water and soil pollution.

(3) Strengthen pollution control. For water and soil pollution problems that have already occurred, pollution control should be strengthened, and effective measures should be taken to restore the soil and water resources [6].

### 3.5 Problems in animal husbandry

Modern animal husbandry refers to the industrialized production mode of livestock and poultry products, which has the characteristics of high efficiency and large-scale production. However, modern animal husbandry also faces many food safety problems.

(1) Environmental problems in animal husbandry. In modern animal husbandry, the breeding density is relatively high and the environment is relatively closed, which is prone to the breeding of harmful organisms such as diseases and bacteria, leading to the presence of harmful substances in livestock and poultry products.

(2) Residue of veterinary drugs. In modern animal husbandry, a large amount of veterinary drugs are used, which can easily lead to the problem of veterinary drug residues.

In order to solve the food safety problems existing in modern animal husbandry, the following measures can be taken:

(1) Strengthen the management of animal husbandry environment. The management of animal husbandry environment should be strengthened, effective measures should be taken to prevent the breeding of harmful organisms such as diseases and bacteria, and the amount of harmful substances in livestock and poultry products should be reduced.

(2) Establish a veterinary drug residue detection system. A veterinary drug residue detection system should be estab-

lished to strengthen the detection of veterinary drug residues, and to timely discover and handle livestock and poultry products with veterinary drug residues.

(3) Promote healthy breeding techniques. Healthy breeding techniques can reduce the dependence on veterinary drugs, improve the quality and safety of livestock and poultry products.

## **4. Solutions of Modern Agriculture to Food Safety**

Despite the many challenges to food safety posed by modern agriculture, there are still many solutions that can be employed to address these issues. This section will explore some solutions of modern agriculture to food safety, including strengthening regulation, promoting green agriculture, adopting biotechnology and enhancing consumer education.

### **4.1 Strengthening Regulation**

Strengthening food safety regulation is the key to addressing modern agricultural food safety issues. The government should strengthen regulation of agricultural production and food processing, establish sound food safety laws and systems, establish sound food safety regulatory agencies, and enhance food safety monitoring and testing. At the same time, the government should also strengthen management of food production enterprises, enhance hygiene and safety controls during food production processes, punish and crack down on violations, and promote food safety guarantees.

### **4.2 Promoting Green Agriculture**

Green agriculture is an agricultural production model based on ecological environment, with the goal of protecting the environment and improving agricultural production efficiency. Green agriculture ensures food safety and also helps to improve the quality and nutritional value of agricultural products, and increase their market competitiveness. Green agriculture also helps to reduce the use of chemical pesticides and fertilizers in the agricultural production process, reducing pollution risks and promoting the healthy development of agricultural ecosystems.

In addition, farmers can use more environmentally friendly agricultural technologies, such as organic agriculture and ecological agriculture. These agricultural methods use ecosystem services to maintain soil health, reduce environmental impact, and increase crop yields. Organic agriculture uses natural organic materials instead of chemical fertilizers, and adopts natural control methods to suppress pests and diseases without producing toxic pesticide residues. Ecological agriculture includes planting and breeding, using the ecosystem of farmland and pasture to maintain ecological balance and increase crop diversity [7]. Through these methods, the use of chemicals and fertilizers can be reduced, reducing environmental pollution and the risks to human health.

### **4.3 Adopting Biotechnology**

Biotechnology is a technology that uses living organisms or their parts to manufacture or improve products or services. In modern agriculture, biotechnology can be used to improve seeds, increase disease resistance, enhance yield, and improve the quality of agricultural products. For example, gene editing technology can be used to change the DNA of plants or animals to improve their characteristics, such as disease resistance, drought tolerance, cold resistance, etc., thereby reducing dependence on pesticides and fertilizers. However, biotechnology also raises some controversies because it may have an impact on ecosystems and may even pose potential risks to human and animal health. Therefore, when adopting biotechnology, adequate scientific assessment and safety checks are necessary to ensure its safety and sustainability.

### **4.4 Strengthening Consumer Education**

Consumers are the ultimate beneficiaries and decision-makers of food safety, so they need to understand the relevant knowledge of food safety to better protect their health. Consumers can reduce the risk of food safety by reading food labels, choosing organic food, avoiding buying expired food, and other methods. In addition, consumers can also improve their understanding of food by participating in community agriculture, learning cooking skills, and other methods.

## **5. Conclusion**

The development of modern agriculture has had a profound impact on food safety, including issues such as pesticide and veterinary drug residues, genetically modified foods, water and soil pollution, and problems in the livestock industry. In order to ensure food safety, a series of measures need to be taken, such as strengthening supervision, promoting green agriculture, using biotechnology, and strengthening consumer education [8]. Among them, strengthening supervision is the most basic safeguard measure, and the government should strengthen testing and supervision of agricultural products, while also promoting green agriculture and using more environmentally friendly production methods to produce food. In addition, biotechnology is also an important way to solve food safety problems. For example, gene editing technology can make food safer and more nutritious, which is of great significance for ensuring food safety. Finally,

consumer education is also a very important aspect. By strengthening education for consumers, they can pay more attention to food safety, thus promoting the healthy development of the entire food safety system. Therefore, modern agriculture needs to continuously improve its food safety measures while efficiently producing food, in order to ensure people's health and safety.

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