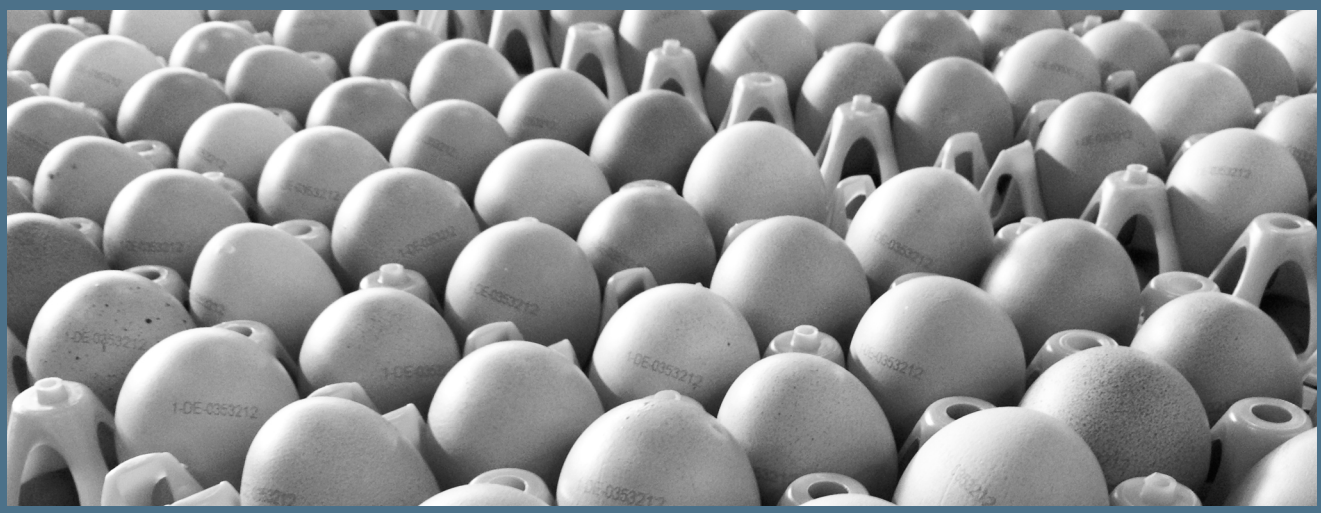
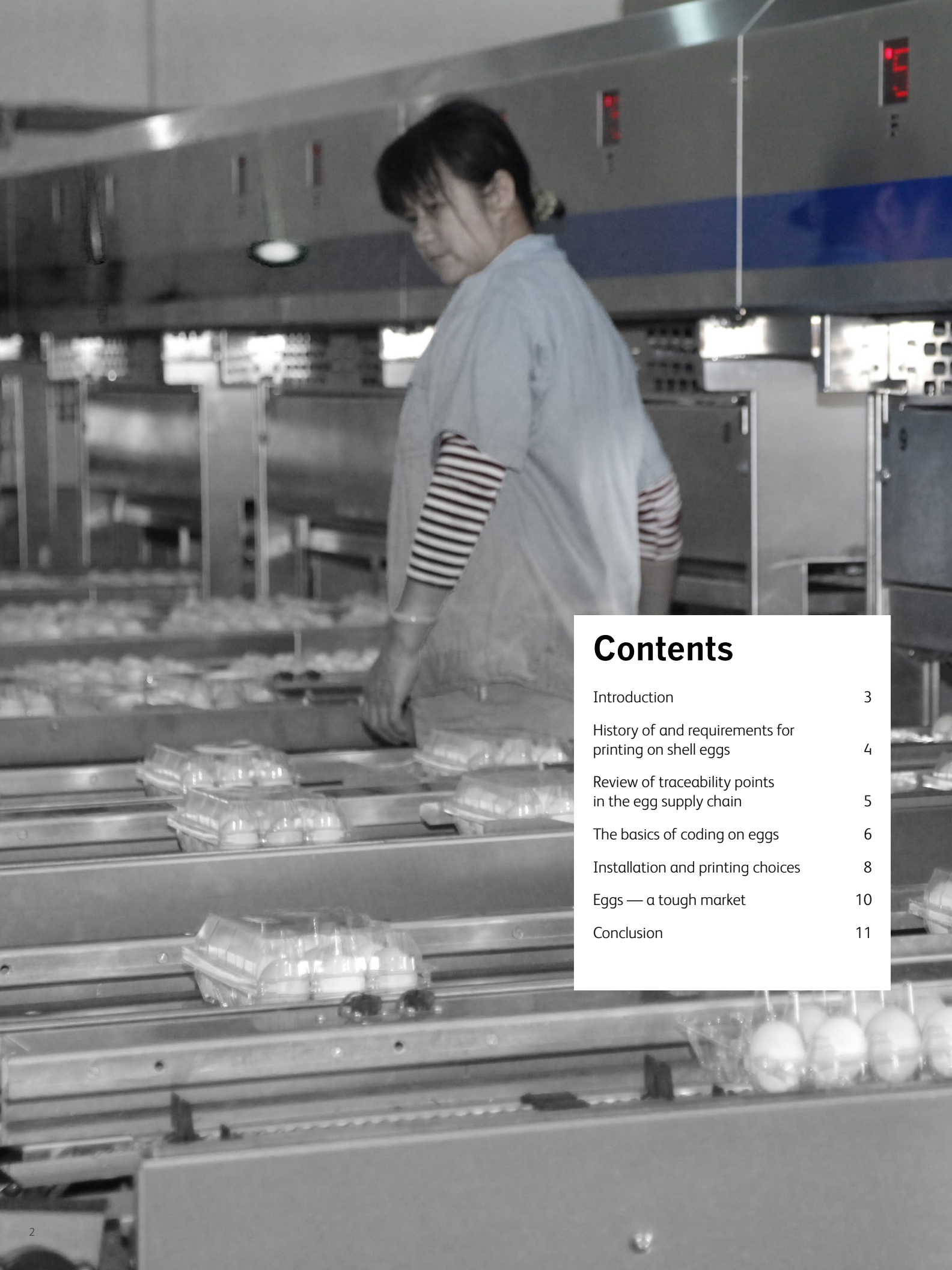
White paper

Improving food safety and brand identity by printing directly on shell eggs



Consumer concern over food safety has grown steadily in recent years, pressuring regulators to oversee egg production more closely and increasing the need for egg producers and wholesalers to provide information about their eggs. This white paper is intended to give an overview of the process involved in printing directly onto shell eggs.



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Consumers want to know where their eggs were produced, how they were produced, and that they can trust that the eggs are safe to eat.

In addition, as consumer focus on healthier eating has increased, consumer taste in egg choice has changed.

The day when everyone ate simple white eggs is in the past. Consumers today prefer to choose from a wide variety of different egg products that they are confident are fresh and healthy. These two influences have driven a demand among both consumers and regulators for more information about eggs that is easily accessible.

In response, various egg producers around the world have begun printing date and lot codes directly on shell eggs to indicate freshness and graphic logos to promote brand identity, resulting in significant financial reward. Continuous Inkjet (CIJ) and laser marking technologies have been developed as printing solutions that meet the requirements of regulators and consumers alike, while integrating into existing egg grading equipment for optimum production efficiency.

History of and requirements for printing on shell eggs

The history of printing on shell eggs

Coding information directly on eggs began in Europe in the late 1950s as a way to provide consumers a means to identify high-quality eggs. The code used included a number that identified the specific egg packing station, thus establishing an early, very simple traceability system. Further advancements in the egg coding requirements that now are prevalent in Europe were driven by egg contamination scares that occurred in the late 1990s. In 1998, for example, the UK government announced that most of the eggs in the UK were infected with salmonella. As a result, egg consumption in the UK dropped by 60 percent.

In the late 1990s, a new salmonella vaccine for eggs was introduced, and the egg industry, via the British Egg Industry Council, instituted the Lion Quality Code of Practice that included many food safety practices voluntarily implemented by egg producers and packers. The industry also adopted the Lion Quality symbol to reassure consumers that any shell egg bearing the symbol was safe from salmonella.

European Union egg marking requirements

Today, the European Union (EU) is the world's largest trading zone, with 500 million consumers, and EU food legislation is often a leader in launching new requirements, especially those governing food safety.

The EU has extended egg-coding requirements across its membership to ensure egg safety and traceability. EU regulations specify that Class A shell eggs marketed to retailers for sale to consumers must be marked with the egg's farming method, country of origin, and farmer registration code. Many packers also code a "Best By" date to help consumers make informed buying decisions.

EU egg coding requirements create a harmonized set of regulations for Class A shell eggs, since the same regulations cover all 27 EU countries. At the time of this writing, the EU does not allow the importation of Class A eggs from the United States for sale directly to consumers because EU law requires that a foreign exporting country maintain a salmonella monitoring system and that the hens meet the housing requirements specified in the European Union.

The USDA is currently negotiating with the EU for clarification on regulations for Class B egg imports. Currently, only Germany, Spain, the Netherlands, and Bulgaria will accept Class B egg imports from the US. The importation agreement requires that every egg have a 5mm "B" in a 12 mm circle coded on the egg, or a 5mm circular mark on the egg. This mark must be on the round end of a Grade A egg and be clearly visible when the carton is opened, or when viewing a flat of eggs. This mark must be printed with food-grade ink.

Review of traceability points in the egg supply chain

The goal of traceability is to enable researchers to identify the original source of a particular egg and the touch points it has passed through between that source and the consumer, and then to supply retailers and consumers with the identification codes of items being recalled. At present, that capability does not fully exist, though many of the steps along the way are in place and are being used regularly.

Retail partners typically require pallet and case level item identification, depending on their individual requirements. Pallet and case level identifying codes, for example, are used to route product efficiently to a regional distribution center and are then used by the retailer to process items from the DC to individual retail stores. This practice creates a traceability chain that makes pallet and case level identification the first line of defense in a product recall, since large quantities of suspicious product can be quickly quarantined by simply using the product information on the package.

Carton level identification is currently mandated in most countries. This coding typically includes the relevant plant number, the pack date and a freshness date for the consumer. These codes provide traceability information for tracking the eggs within the carton back to the farm and packing date, and enable authorities to easily and accurately identify specific egg cartons for consumers when a recall is ordered.

Egg level identification provides the most reliable level of identification because it creates an item-level identification that the consumer can use both to determine individual egg freshness and regulators can use to trace individual eggs directly back to the farm and flock that produced them. This item-level identification is ideal from a traceability perspective because the code stays with the egg no matter how many times it is mixed with other eggs while being graded, sorted and packed.

Benefits of coding directly on an egg

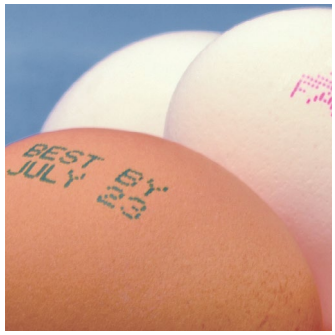
For the consumer, coding directly on the egg provides peace of mind that the eggs are safe to eat by the "Best By" date coded right on the egg. Plus, that code stays with the egg no matter what package it finds itself in.

Retailers benefit by complying with government regulations for selling eggs. In addition, coding directly on the egg provides an opportunity to brand the egg to build better brand loyalty.

Government regulators can utilize direct egg coding to improve food safety and to simplify and expedite a food recall even after coded packaging has been discarded by the consumer.

Packers and graders benefit by complying with retailer requirements and with food safety and egg laws, and can use direct egg coding to brand their eggs to help build consumer loyalty. Coding directly on the eggs may also help meet export requirements.

The basics of coding on eggs



The basics of coding on eggs

Whether you are evaluating the prospect of printing codes directly on eggs or looking into upgrading existing equipment already doing so, there are some key items to keep in mind as you research that investment.

Coding directly on eggs is a challenging endeavor. Eggs vary in size quite dramatically when you consider the difference between jumbo and small eggs. They vary in color, and consumers expect the code will be legible no matter the color. The egg shell material can vary, depending on the hens and their diet, altering how well the ink adheres to the shell or how well the laser creates images on the egg. They can range from clean to dirty, and from dry to damp depending on the environment and previous processes they have been through. Through all this variation, the coding solution you choose must provide optimal printing performance to meet the customer's requirements.

Government regulations will also identify key requirements that will influence your decision process. For example, applicable regulations may specify the types of technology that can or can't be used to mark the egg, as in the case of the Class B EU requirements. This will force you to choose a specific technology solution. The regulations will likely specify the volume of information to be coded on the egg, which will also influence coding equipment selection. The regulations may also specify time frames for "Best By" information and might specify where the code must be placed on the egg, which will impact printer integration and mounting.

In most cases, printing equipment that is integrated directly with the grading equipment will maximize the results of your significant grader investment. For older existing grading equipment, understand that there may be additional grader investments required. Work closely with the grader manufacturer to understand the integration options. Tight grader integration is beneficial, because the grader will control the printing equipment directly and will ensure the right code is on the right egg.

Printers that are not integrated with a grader that provides information operate in a standalone mode. This is a likely scenario in an operating environment for a farmer or packer who only wants to print the producer identification number or a logo on each egg to differentiate its eggs from others on the market. Printers in a standalone integration are programmed when they are installed, and they print the same information on every egg, every day.

In operations with the simplest level of integration, the printers get direction from the grader controller. When there is a change in the egg coding requirements to print a different producer code, a different logo for a different brand or a different "Best By" date for a different egg grade, the grader control system determines the correct code and then triggers the printer to print on the specific egg as it arrives. The various print formats are programmed into the printer manually, and additional formats have to be created and added manually.

At the best level of integration, the egg grader control system directly controls what the printers are going to print without any operator intervention. Different formats can be created directly in the grader controller rather than by inputting them directly into the printers. Any change originated at the grader control center that requires a printing change is automatically rolled out to the appropriate printers. This type of integration is highly dependent on the age of the grader and the level of the grader's control system software.

Installation and printing choices

Installation choices

The optimum location for the printer installation depends on the printing technology being used to print on the eggs. Continuous inkjet printers and their printheads are most often installed just downstream of the grader transfer area, where the eggs are beginning to move down the tracks towards the packing lanes. Placing the solution near the transfer area allows every single egg to be printed. Each track will require one printer and one printhead. This location is also the most challenging from a speed, space and environmental perspective. At a grader speed of 45 m/min, the printer has about 40 m/sec to print on an egg, whether printing pole-to-pole or across the top of the egg. In this time, the CIJ printer can print two lines of text.

Laser marking solutions installed in-line will be able to mark a limited amount of information on each egg, because of the speed of the eggs. Laser marking solutions are most often installed in the packing lanes because they require more space and because they print at a slower speed. Since they are mounted in the packing lanes, each lane will require multiple lasers and those printers can only print on the eggs in that lane. The number of lasers required will depend on the number of lanes that will be needed to pack coded eggs. If the grader has 16 packing lanes and all lanes need to be capable of coding on eggs, then at least 32 lasers will be required and probably more.

Printing choices

The vast majority of eggs are coded using ink-based systems, since ink-based printing is very cost-effective and because it has the least impact on the egg. Red ink is most often used, to provide the highest visibility. The inks used for egg coding must be food-grade inks to prevent any risk of contaminating the egg with the chemicals found in non-food grade inks, and must be compliant with local laws where the eggs will be consumed. These food grade inks typically dry quickly in 2-3 seconds and are resistant to moisture and washing once dry. These inks also must be manufactured in controlled operations that comply with Good Manufacturing Practice (GMP) requirements. As you evaluate ink suppliers, confirm their GMP compatibility.

National regulations will dictate whether eggs must be washed. When implementing an ink-based egg coding system, it is very important to make sure that the eggs are as dry as possible prior to printing. In most cases, eggs are dry after they pass from the washer through the candling, weighing and transfer areas. If there is a need, because of high humidity or poor drying equipment, install an air knife to dry the eggs in the surface area where the code will be printed. Adjust the air knife air pressure to achieve optimal dryness without damaging the egg, as excessive air pressure can crack a good egg.

While the majority of egg coding is accomplished with inkjet solutions, a laser-based solution is an alternative method. Laser has two benefits over inkjet printing: it does not consume any ink in marking the egg and it is less affected by moisture. Laser marking works by microscopically ablating the surface of the egg to alter the color of the shell. Laser coding is very legible on both brown and white eggs.

Another side effect of laser use is that the shell marking will create minute amounts of egg shell dust. This dust is typically extracted using a ventilation system, but over time, a significant volume of dust can be created. This dust is basically calcium dust, which is abrasive and if not properly removed, can cause wear to nearby equipment.

Eggs — a tough market

A tough coding environment

Egg grading and handling is a messy process, and keeping the equipment clean is very challenging. While every effort must be made to maintain high levels of cleanliness to comply with food safety regulations, between cleanings the equipment inevitably gets dirty with egg residue throughout the grader.

Maintenance requirements are highly correlated to the location of the coding equipment and to the cleanup procedures. In-line egg coding just downstream of the transfer area is potentially the messiest area, since graders often eject eggs in this area, eggs sometimes slip out of the grippers and water often drips. It is important to institute procedures to ensure that coding isn't interrupted by errant egg debris that prevents other eggs from being coded properly. It is also important to have recovery procedures in place to quickly correct any interruptions in the coding capability, which includes training staff to spot-check for improperly-coded eggs.

To compensate for the possibility of unprinted eggs exiting the system, operations currently coding on eggs with in-line CIJ printers have established procedures to check for unprinted eggs. In a manual pack operation, workers are trained to check eggs in cartons by opening and checking a carton in every few cases. In an auto pack operation, workers check the eggs in the cartons that have not closed, eggs in trays in the off-grade lanes and eggs packed in trays for commercial use. When a problem is detected, the line operators check for printing problems, which typically requires stopping the grading process. Depending on the extent of the problem, the eggs will be re-graded and re-coded or allocated as breakers.

To maximize the working life of your equipment and to lower nuisance interruptions, establish procedures to adequately protect the coding equipment during regular cleaning operations, and clean the printheads as part of major cleaning operations. Cleaning involves removing the printheads form their mounting hardware and carefully removing any debris per the manufacturer's procedures. Some operations perform major grader cleanup weekly. If during this cleanup the tracks and transfer area are cleaned, it is best to cover the printheads to prevent any damage to them.

The future of egg marking

In the US, the Egg Safety Law of 2010 and the subsequent update in 2011 have specifically focused prevention efforts on keeping disease out of the egg supply chain. While these prevention efforts do not currently include methods to track individual eggs all the way from the producer to the consumer; there's interest in volunteer use of egg coding to differentiate eggs. Producers around the world who have voluntarily adopted egg coding have indicated that it has raised consumer confidence in their eggs. Some claim that it's only a matter of time before this is legislated, so getting ahead and deploying egg coding solutions at their pace helps to promote themselves as industry leaders. This is also a viable strategy for producers in emerging economies who want to establish brand and want to be prepared for future export opportunities.

The growth of specialty eggs has opened new opportunities for higher profits and improved brand awareness. Adding egg information to specialty eggs helps consumers build greater confidence in what they are purchasing. Some graders are purchasing egg coding to market directly to specialty egg consumers. The higher profit margins support the investment. Over time, they plan to advance egg coding to all their eggs, after they capitalize on their improved presence in the specialty egg market

Eggs are a tough market

As the global economy has slowed in the last several years, consumer trends have shifted to preparing more at-home meals. This drives increased consumer spending at grocery stores, which in turn benefits egg producers because eggs are recognized as a prime source of high quality protein. Continued economic slowness will support a continuation of this trend. At the same time, the specialty egg segment has been experiencing price premiums driven by increasing consumer concerns about food safety, animal welfare and healthy eating.

According to the International Egg Commission (IEC), global egg consumption is expected to grow at 7% through 2015. However, profit is highly dependent on feed costs and the perception of eggs' nutritional benefits. Consumer confidence in egg safety and prevention of recalls such as the one that plagued the industry in 2010 will be of critical importance in supporting that level of growth.

Conclusion

As food safety concerns continue to gain both regulator concern and media attention, and as consumer demand for safe, healthy food continues to remain an important priority, expect more pressure to be applied to egg producers to improve operating procedures and increase emphasis on more effective traceability methods. Consider adopting an egg coding solution that will position your organization as a leader in food safety, help open export markets for your eggs and enable you to identify and differentiate your brand on each and every egg.

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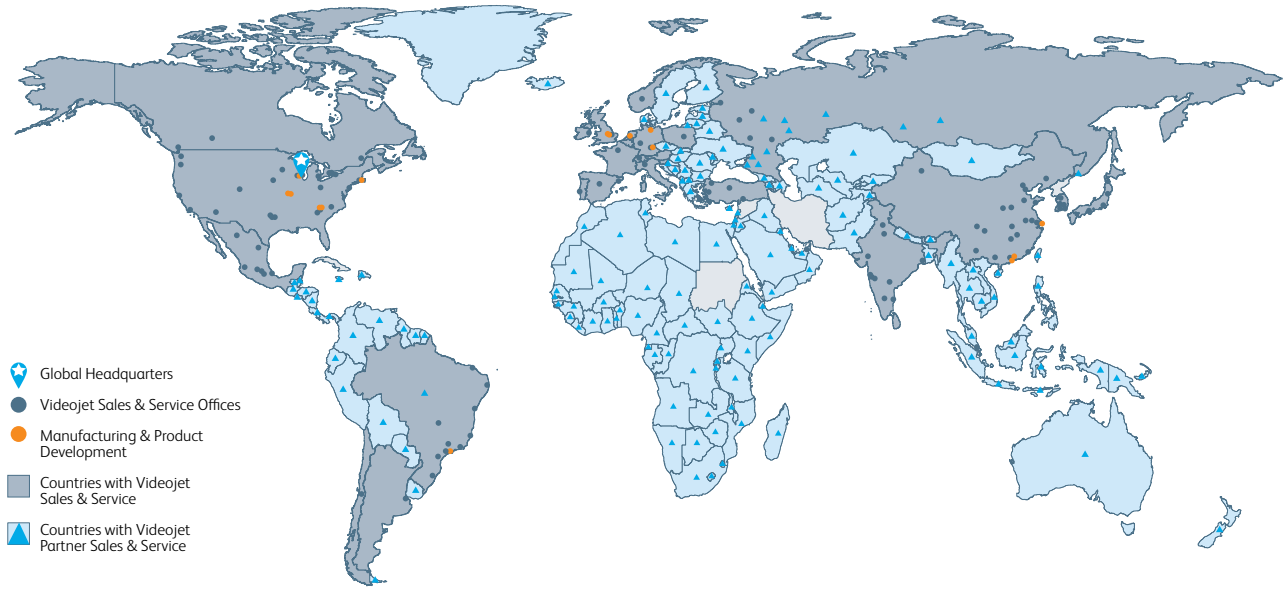

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