

Integrated White Pekin Production Systems

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Abstract

Over the past 50 years, improvements made in White Pekin duck breeding stock through modern genetic selection techniques have been very significant. The genetic improvements in weight per day of age, feed conversion, feathering and meat to fat ratio of the final carcass are only fully realized when translated to overall meat duck performance and evaluated in a real-life economic model. Genetic improvements can be further enhanced by advancements in duck nutrition and management that allow the progeny to achieve their genetic potential.

Key genetic improvements have been brought about via selection of individual ducks and genetic family information to bring about improvement in growth rate, feed efficiency, breast meat deposition and early feathering. Optimizing the improvement of these traits is accomplished with highly complex, multifaceted pedigree selection tools employed with a high level of discipline and accuracy. These pedigree tools allow for simultaneous selection for traits that have both high and relatively lower heritability. Some of the traits with lower heritability are egg production, hatch ability, leg fitness and cardiopulmonary fitness. These are very important in overall performance and profitability.

Due genetic improvements, the modern domestic White Pekin currently outpaces the modern broiler chicken in terms of gain and feed efficiency to the same live market weight. Like the modern broiler, the more sophisticated duck strains perform better in modern intensive production systems that provide adequate shelter, nutrition to optimize early growth, and protection from disease through biosecurity and health programs.

Improvements in some domestic White Pekin strains have taken advantage of the duck's natural ability to grow rapidly and its freedom from fitness maladies plaguing other poultry livestock, allowing producers to drastically reduce input costs while improving carcass quality and feathering.

This paper will illustrate the duck performance improvements made over time and illustrate the role of the **INDUX**TM integrated duck management system to maximize genetic potential at Maple Leaf Farms while minimizing input costs to optimize the modern duck production system.

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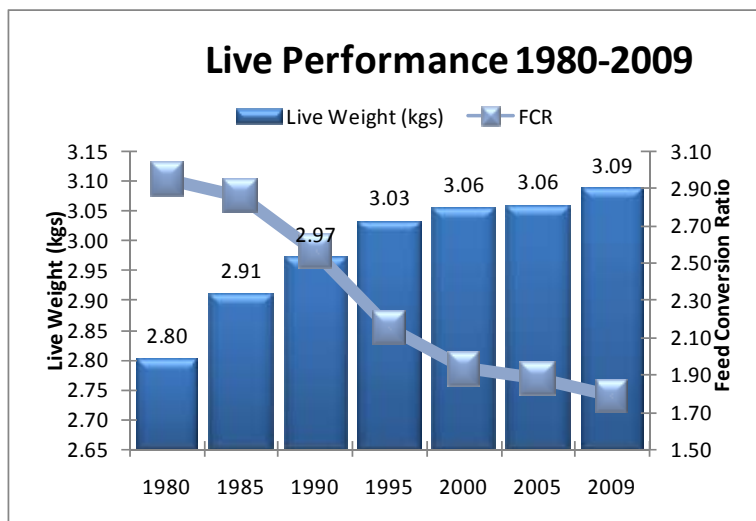
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Genetic Improvement

Each Maple Leaf Farms pure line strain has unique characteristics to contribute. These unique pure lines serve as building blocks to make the ultimate commercial growing duck that meets the customer's market requirements while providing the best cost of production.

Maple Leaf Farm Genetic Research Department regularly runs strain comparison trials to assess each pure line, the crossbreds they create and how they compare to other strains that are not of Maple Leaf Farms origin. The series of following tables illustrate performance improvements, which are increasing over time across very diverse geographic areas and feed ingredient profiles.

Commercial meat duck performance: Company-owned farms, Maple Leaf Farms - USA

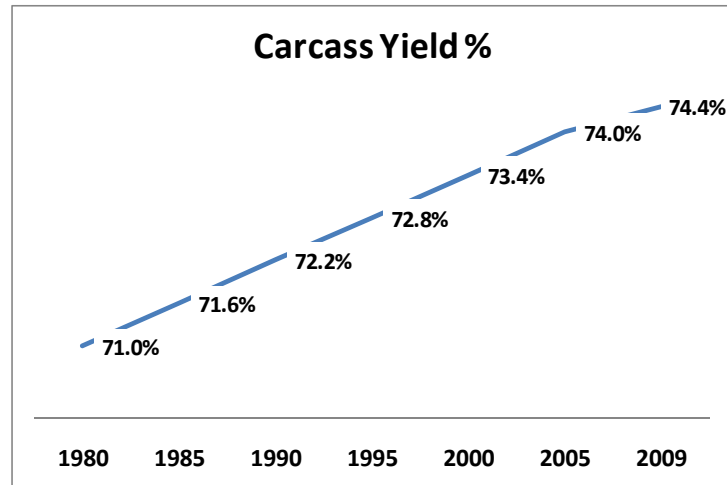


Live weight has increased as feed efficiency has improved.

A duck weighing 290 grams more is eating 2,800 grams less feed.

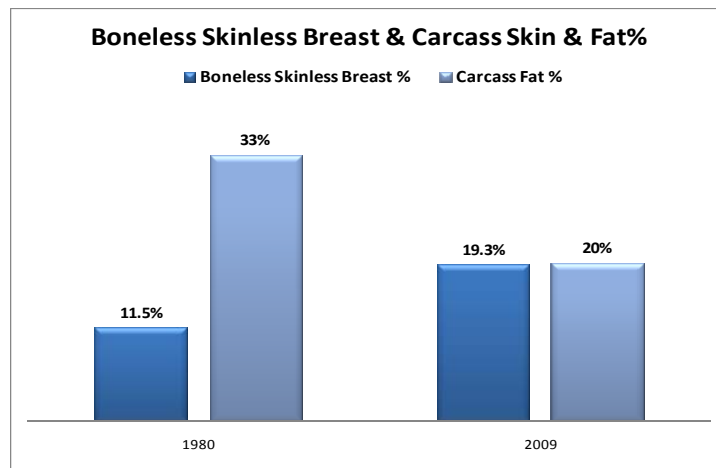
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Yield has improved by 3.4% or 310 grams with 2,800 less grams of feed.

Yield improvement with less feed helps the bottom line.



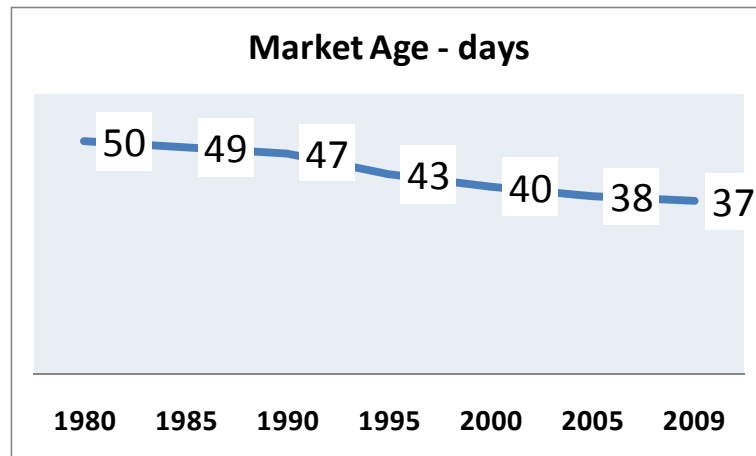
Carcass yield has been driven by increasing meat, not fat.

Grams of total meat* yield has also improved.

*Total meat is breast, leg and thigh meat

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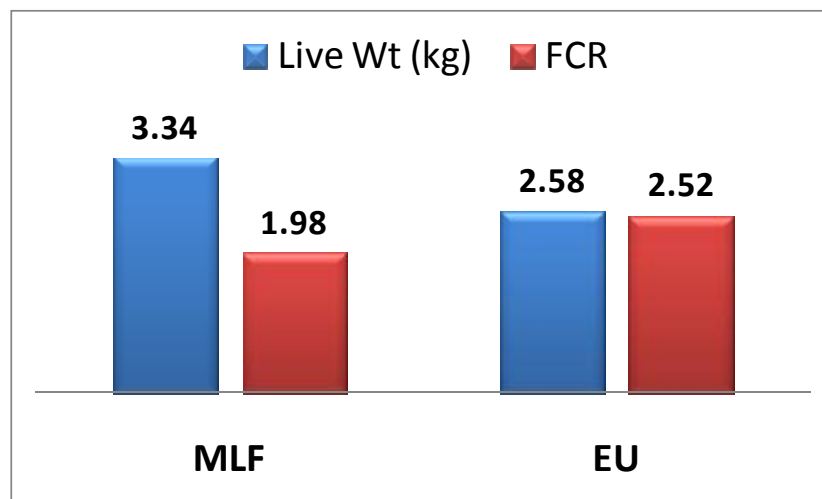


Reducing market age to the same carcass weight reduces other non-feed* input costs.

*Litter, utilities while reducing losses due to mortality and optimizes fixed assets by reducing turn-around time

Strain comparison MLF strain v European Strain study conducted in Europe - 2008

Live weight and feed conversion at a harvest age of 42 days.



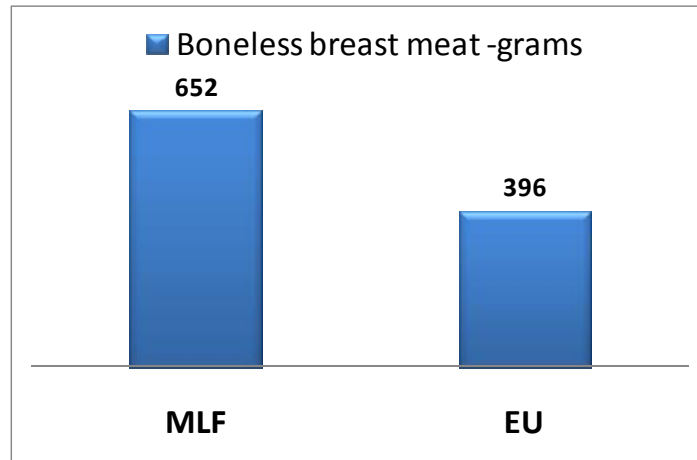
760 grams more weight on 130 grams more feed.

A feed conversion (FCR) difference of 0.54.

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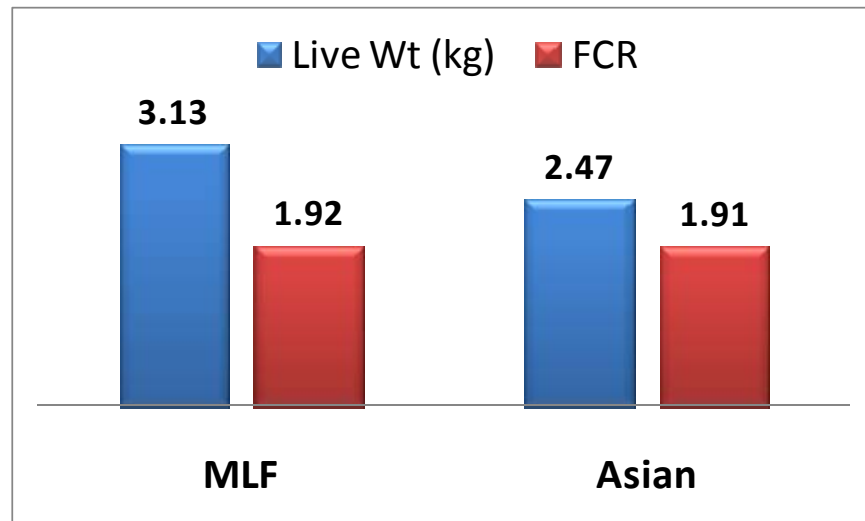
Duck Breast Portion



256 grams more breast meat at the same age – an increase of over 60%.

Strain comparison MLF v Competitors Strain study conducted in Asia - 2009

38 day harvest age

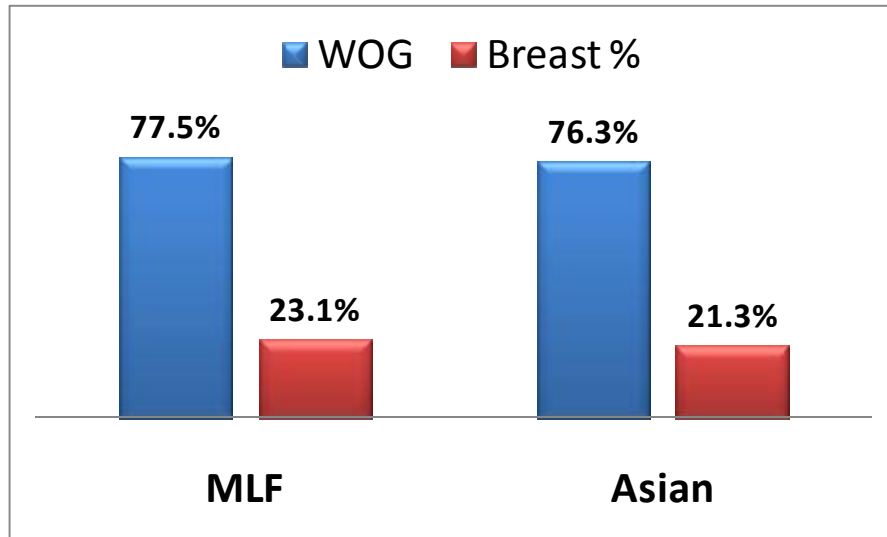


Essentially the same feed conversion with a difference in gain of over 600 grams at the same age.

Potential feed savings to equal weight estimated to exceed 500 grams per duck.

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The Maple Leaf Farms duck had a 1.2% better carcass without giblet yield than the Asian strain.

The difference in yield was due to a 1.8% greater breast meat yield.

Genetic Summary:

The data illustrates the Maple Leaf Farms genetic program has provided large gains in growth rate, improved breast meat and carcass yields along with improved feed efficiencies. The program continues to focus on these improvements while also improving fitness and reproductive performance in the strains under selection. These improvements have been demonstrated over a large range of geographic climates; USA, Europe and Asia. The ducks were fed feed manufactured in the countries where the studies were conducted.

Regardless of location or feed, carcass yield is the critical metric to consider when assessing feed cost savings as carcass weight is what we sell. Ensuring the improvements are coupled with improved feathering also yields more profit. For example, the amount of feed to produce a gram of breast meat at 35 days has improved by almost 300% and has been achieved with 2.8 fewer kilograms of feed per duck.

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Maple Leaf Farms genetic programs recognize the value of a balanced selection program. In addition to pursuing improvements in growth rate and feed efficiency, we have also placed great emphasis on breast meat and carcass yield, feather maturity, reproductivity (egg production and hatch) and fitness traits (leg strength and cardiopulmonary function). By having a balanced genetic program, we have been able to optimize input costs, improve physical asset utilization and continuously improve carcass quality to ensure continued customer satisfaction.

INDUX™ System: technical support

Genetics alone does not fully optimize production cost and efficiency. Consideration must be given to nutrition, husbandry, duck health and environmental management. The **INDUX™**, integrated systems approach to duck management is the best means to incorporate all the elements necessary to provide efficient and sustainable duck production into the future.

Nutrition:

Feed must meet formulation specifications and the requirements of the duck. Today's feed mills use modern formulation techniques to control their processes and are able to meet formulated specifications within very tight tolerances. An area of nutrition that is equally important is feed quality. Feed must be free of pathogens, toxic compounds and environmental pollutants. Consistent pellet quality is key.

Ingredient quality assessment

All incoming ingredients are monitored for specific mycotoxins based on the history of mycotoxin risk of the ingredients used.

Conventional wet chemistry and near infra-red analysis of ingredients, water and finished feeds ensures that feeds are accurately manufactured to specification.

Pellet quality

The standard for pellet quality at Maple Leaf Farms is 95% pellet durability at the point of delivery to the farm. This standard is achieved through formulation, precise control

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feed conditioning prior to pelleting, precise control of the pelleting processes, proper cooling and allowing the pellets to mature prior to shipping. These processes are carefully and continuously monitored and finely tuned to ensure quality standards are met and improved.

Toxiscreen™ a duck-based biological method for assessing for the presence of harmful toxic compounds found in feed ingredients, water and litter. This quality assurance tool measures for the presence of toxic compounds that lead to reduced cell growth and/or destruction of cells. The degree of growth inhibition or cell death is scored and is related to and indicative of the concentration of toxic compounds.

Pathogenic bacteria assessment of feed ingredients and water is also an important quality assurance tool used to protect the duck and optimize performance.

Nutritional research and development

Ducks have a huge potential to convert feed ingredients quickly and efficiently into meat and feather. Maple Leaf Farms has been focused on optimizing the ducks genetic potential by paying close attention to nutrition in a manner that goes beyond the cost of a ton of feed. Our focus has been on the value generated by ton of feed relative to its cost. We have used research to concentrate on that value generation through more than 100 duck nutrition studies in collaboration with leading Universities. We have and are continuing to assess the ducks needs for growth, health, and skeletal development while optimizing feed cost relative to end product value.

Each year the scope and depth of these studies has increased to allow us to incorporate the assessment of livability, growth rate, feed efficiency, feathering, carcass composition, immune response (measured in terms of IgG, IgM, IgA and complement), skeletal and gut development. We have a team dedicated to running a minimum of four large studies each year across all four seasons in facilities modeling the commercial production environment. Knowledge gained from these studies has allowed us to

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further optimize the ducks genetic potential and ensure our feed recommendations are at the leading edge of duck nutrition and performance improvement.

Nutrition plays a very major role in modulating the susceptibility of the duck to infectious diseases. By focusing on the intestinal tract and its development, we have been able to enhance nutrient absorption and utilization by the duck.

Feed additives that enhance gut health; such as enzymes, oligosaccharides, prebiotics and probiotics have been extensively researched to determine how to best promote early intestinal development and protect the gut later in life. A healthy gut not only promotes duck health, but it also provides the economic benefit of improved feed efficiency and has a positive impact on the environment and sustainability by reducing the excretion of phosphates and nitrogen compounds.

Duck Health:

Good health and performance of the duck depends upon many factors including genetics, nutrition and housing, as well as the frequency of exposure to pathogens and vaccination programs.

Promotion and protection of gut health

LivPro™ counters pathogens by:

1. *Competitive exclusion*
2. *Production of antimicrobials*
3. *Production of organic acids*
4. *Stimulation of immune response*
5. *Enzyme activity*
6. *Reduction of toxic amines*

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Research has shown that this reduces mortality and morbidity as well as improving weight gain and feed conversion

LivPro™ **Benefits**

- ✓ *Improved resistance to disease*
- ✓ *Increased weight gain, growth rate, FCR*
- ✓ *Improved quality and quantity of eggs*
- ✓ *Decreased nitrogen and phosphorous in litter*
- ✓ *Decreased need for antibiotic therapy*

Biosecurity and management

Biosecurity

Quality assurance begins with great biosecurity. Because healthy animals yield high quality products, we take many steps to protect our ducks from disease. We do not skimp when it comes to disease prevention. In fact, a few measures of our comprehensive biosecurity program include:

- Housing the protects the ducks from external environment insults and exposure to wild bird pathogens
- Providing barriers such as clothing changes, dedicate foot wear, hand and boot disinfectants to prevent pathogen entry into the duck barn
- Completely cleaning out (including bedding) and sanitizing barns between every flock
- Employing pest and rodent control programs
- Employing vaccination programs to guard against local pathogen risk
- Limiting visitor access
- Testing every flock for avian influenza prior to processing

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Management

Maple Leaf Farms has developed technical manuals and detailed standard operating procedures for all key livestock production process in feed manufacturing, breeder, hatching, grower and transportation of ducks.

Duck Well-Being:

At Maple Leaf Farms, we have long acknowledged that the quality of our products and the success of our business are directly linked to the health and well-being of our animals. In fact, our company is committed to promoting and maintaining high standards of science-based animal well-being through educational materials and training programs for duck caretakers.

Our comprehensive duck well-being guidelines address a number of areas that are critical, including:

- Flock and Health Care Record Keeping
- Housing, Flooring & Equipment
- Ventilation & Temperature Control
- Stocking Density (Space Allotted Per Bird)
- Biosecurity & Disease Control
- Feed & Water
- Handling and Transportation

Natural Resources Conservation:

Preservation - We take a proactive approach to environmental management and work to educate them on how to properly manage waste and conserve water.

Recycling and by-product value creation - We continue to remain committed to sustainability by seeking out opportunities to recycling, develop valuable by-products and promote conservation.

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Sustainability:

Today's duck consumers have access to unlimited quantities of low cost, high quality food. They expect the ducks they consume to have been raised under the highest of standards of duck well-being, environmental management and natural resource conservation. When these consumers choose what duck products they will buy, they consider these factors along with the cost of the item.

Maple Leaf Farms *INDUX*[™] integrated duck management system optimizes the duck's genetic potential and reduces producer costs while addressing the important social issues of environmental pollution and duck well-being to meet high consumer expectations.