Livestock Research for Impact

WAGENINGEN
UNIVERSITY & RESEARCH

"Our researchers feel the drive to make a difference, the impact of their work makes them proud"

Annie de Veer, director Wageningen Livestock Research

Livestock research for impact

The challenge facing the animal production chain is to produce animal products in a responsible way, using methods that safeguard animal welfare, protect our living conditions and environment; and promote good animal and human health. At the same time the animal production chain needs to be profitable, with efficient resource use and closing potential yield gaps. To achieve these goals the livestock sector requires innovative and sustainable solutions. That is precisely what Wageningen Livestock Research stands for: offering science based solutions for a sustainable and profitable livestock sector. The adopted solutions have a demonstrated impact on societal, economical, and or environmental levels.
This booklet presents some examples from overall research themes like animal welfare, healthy living environment, resource efficiency, and biodiversity.

Annie de Veer, director
Wageningen Livestock Research

"New web tools, training, and coaching reinforce craftsmanship and stimulate many dairy farmers to start grazing again"

Bert Philipsen, researcher Animal Nutrition

Grazing cows: icons of the Dutch landscape

Over the last decades, due to environmental issues in combination of growing herd sizes and installed automatic milking systems, grazing has become less favourable. The share of grazing dairy farms decreased from 91% in 2007 to 81% in 2011. Societal pressure has triggered government and stakeholders in 2012 to bend this trend in the Convenant Weidegang (grazing), aiming to maintain the level of grazing to at least 81%. Wageningen Livestock Research conducts fundamental as well as applied research on all aspects of grazing, i.e. the considerations of keeping cows in-door or out-door; and improving the efficiency of grazing.
All our knowledge and expertise is pivoted to strengthen, renew and substantiate the craftsmanship around grazing. After an all-time low of 77.8 percent in 2014, the percentage of grazing dairy farms increased to 80.4 in 2017; getting close to the target.

"Pigs are highly trainable to defecate on a certain spot, making it easy to install a pig toilet and to remove the excreta"

Nico Verdoes, researcher Livestock & Environment

Neat pigs use a toilet

The natural behaviour of pigs is that they choose their lying area first and thereafter the defecating area. By concentrating faeces and urine depositions to a small area both fractions can be removed separately. At the same time it offers pig farmers possibilities to reduce the environmental nuisance. Separation reduces the formation of volatile ammonia. Quick removal of manure reduces the methane and odour emissions.
After Wageningen Livestock Research tested several pig toilet designs at their Swine Innovation Centre, some commercial pig farms have installed them, based on the gained knowledge. Constructing pig toilets considerably contributes to the mandatory reduction of undesirable emissions from pig farms and contributes to animal (and human) welfare and health. Because of their apparent advantages, pig toilets are expected to be widely used in the future.

"Just imagine how you would feel being attacked by over a thousand mosquitos every night!"

Monique Mul, researcher Animal Health & Welfare

photograph courtesy of Hotraco

Getting close to poultry red mite control

After many years of fundamental research and practice testing, researchers of Wageningen Livestock Research developed an integrated approach to control poultry red mite infestations. The blood sucking mite (*Dermanyssus gallinae*) especially terrorizes laying hens, causing the farmer an annual loss up to one euro per hen. Thousands of mites may attack one hen per night, at the cost of her well-being, health, resilience and egg production. The developed early warning system uses infrared light to count the mites who are attracted to the warm hiding place in a perforated perch. The system warns the farmer when the infestation level passes a threshold to take action. A private company commercializing the mite counter was awarded 30,000 euro by the Province Limburg to support its commercial introduction.

"Good and reliable ANCA outcomes offer dairy farmers a 'license to produce'"

Michel de Haan, researcher Livestock & Environment

Annual Nutrient Cycling Assessment

The Annual Nutrient Cycling Assessment (ANCA - *Kringloopwijzer*) is first of all a management tool. Wageningen Livestock Research has developed ANCA with input of a venturous group of dairy farmers. The outcomes enable farmers to improve their farm management and mineral efficiency. Currently ANCA is a widely accepted tool to provide farm-specific environmental performance figures. Since all output is produced using traceable and reliable input data, ANCA may also be used for licensing, or evidencing environmental performance. Since 2018 the dashboard of the tool provides information on the farm-specific emissions of greenhouse gases and ammonia. This offers farmers valuable insight in the emission levels and mitigation strategies.
ANCA is mandatory for all Dutch milk suppliers. This covers almost 100 percent of the Dutch dairy farms.

"Implementing the Plateau 2.0 design gives a positive boost to the pig sector's public image"

Theo Duteweerd, manager Swine Innovation Centre (VIC Sterksel)

Increasing animal welfare with Pig Plateau 2.0

The two-level pen design for growing-finishing pigs, introduced in 2002, increases the living space by 25 to 40 percent. The extra floor space enables a variety of pen enrichments. The larger living area plus pen enrichments significantly improve the pigs welfare compared to the traditional pen versions. Evaluation of practice experiences since its introduction led to an improved design: Plateau 2.0, e.g. with a collapsible plateau to facilitate easy cleaning. The Plateau 2.0 design offering optimal living conditions, was created in a close collaboration of the business community, pig farmers, Wageningen Livestock Research, the government and the Animal Protection Association. Currently over 70 Dutch farmers have constructed a plateau. The two-level design has also been adopted by farmers in Germany, Belgium and Finland.

"Because of its better animal performance home hatching is increasingly applied in broiler chickens"

Ingrid de Jong, researcher Animal Health & Welfare

Home hatching enhances chick's resilience

It is common practice for most hatcheries not to provide food and water to the newly-hatched chicks. As a result when populating farm units with newly-hatched chicks these chicks may have been deprived of food and water for some days. Research by Wageningen Livestock Research has shown post-hatch food and water deprivation results in reduced body weight and food intake; and may eventually lead to higher mortality over a period of six weeks. With the introduction of 'home hatching' the eggs are hatched inside the farm unit allowing the one-day chicks immediate access to water and food (early feeding). This also prevents the otherwise necessary transport of the one-day chicks from the external hatchery to the poultry farm.
Both aspects have a positive impact on the chick's welfare and resilience.

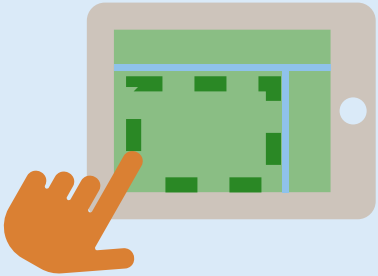
"Looking beyond traditional breed development reveals a whole new range of possible phenotypes and genetic information that helps us to enhance the robustness of our livestock"

Roel Veerkamp, head of department Animal Breeding & Genomics

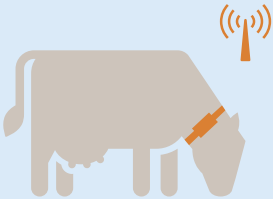
Robust livestock to fit the future

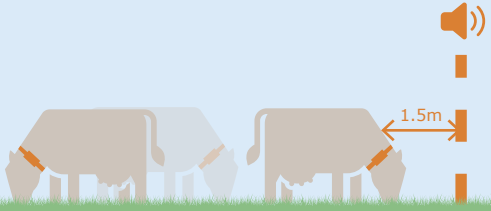
Using and maintaining the genetic diversity to breed new generations of resilient and healthy animals meeting societal requirements, requires novel breeding and phenotyping tools. Wageningen Livestock Research therefore started multi-disciplinary research under the umbrella of Breed4Food. New models for genetic evaluation allowing millions of genotypes for genomic prediction and/or the use of crossbred information, have been developed and implemented in the breeding programs through the MIXBLUP software. This has already led to the trait 'feed intake for dairy cattle'. The Netherlands is the first country to introduce this new trait.
The Breed4Food programme contributes to more robust animals with an improved welfare, responsible use of resources, more added value for consumers, improved food safety, and reduced emissions leading to a lower footprint.

The farmer draws the virtual fence with an app on a tablet or smartphone

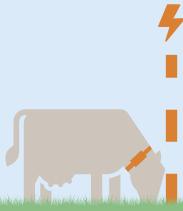


A GPS collar passes the signals on to the cow, and a unit forwards the data to the farmer's app





Within 1.5 m of the virtual fence the cow gets a sound signal coming from her collar



Should the cow proceed anyway, then she runs into a virtual electric fence

Virtual fencing: grazing without visible borders

Wired fences are labour intensive, and hinder efficient grazing and forage production. A virtual fencing system overcomes these problems. Wageningen Livestock Research collaborated in the development of such a method and tested the applicability on its Dairy Campus. Cows wear a collar with a sensor to register her field position and to signal the cow. The cow receives signals as soon as she comes too close to, or threatens to overstep the by GPS coordinates defined virtual fence. This method offers farmers the possibility to graze cows according to their needs. It allows the use of new grazing routines, e.g. give top producing cows in a group priority access to a fresh (highest quality) grass strip. Cows quickly learn how to adequately react to the signals.

The next step towards large scale implementation is technological development of the system into a reliable, sustainable and cost-efficient product.


"Upgrading low-quality protein to high-quality protein, while solving a waste problem, is the ultimate example of circular and bio-based economy"
Teun Veldkamp, researcher Animal Nutrition

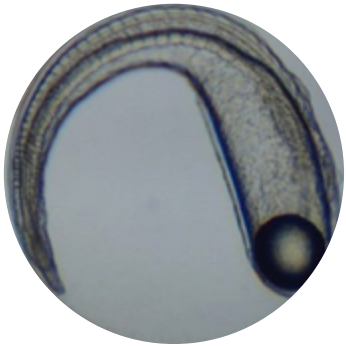
Insects for animal feed

The rising global demand for meat, meat products, fish, dairy and eggs is creating a growing demand for sustainably produced alternative proteins for animal feed. Regular protein-rich animal feed ingredients include fishmeal, soy bean meal, extracted sunflower seed and extracted rape seed. A technical feasibility study by Wageningen Livestock Research substantiated that bio-waste substrates and organic side-streams can be successfully used to feed insects, thereby upgrading low-grade proteins to high-quality proteins, which in turn can be a valuable component of animal feed.
Only recently legislation allows insect protein to be used in fish feed. This is the first step towards the application in animal feed for raising poultry and swine as well.
Our expert knowledge on the use of insect protein in animal feed empowers national and international policy makers in this legislative process.

"We succeeded in producing eel larvae in captivity, but how to grow them up to viable glass eels is still a knowledge gap"

Arjan Palstra, researcher Animal Breeding & Genomics

Eel reproduction in captivity reaches next level



World-wide, natural eel populations have decreased strongly in numbers since the 1970s. Even so, eel farms still depend on the catches of glass eels in nature which are then raised to market size. Propagation in captivity, as researched by Wageningen Livestock Research, could supply aquaculture with glass eels and close the production cycle. Several international research groups working on this issue joined forces in the Eel Reproduction Innovation Centre (EELRIC). This functions as a platform for the reproduction of eel and is home to an international consortium sharing experience and collaborating to force breakthroughs. EELRIC is initiated and owned by the partnership between Stichting Duurzame Palingsector Nederland (DUPAN – representing the Dutch eel sector) and Wageningen University & Research.
EELRIC is a major step towards sustainable eel cultivation.


"Nobody wants to inhale air polluted with particles and endotoxins, our dispersion model maps the vulnerable zones"
Albert Winkel,
researcher Livestock & Environment

Mapping hazardous particulates and endotoxins

Livestock facilities emit particulates which carry endotoxins, through outbound ventilation air. When inhaled, these particles and the endotoxins in it may affect human health. Wageningen Livestock Research in collaboration with the Institute for Risk Assessment Sciences of Utrecht University, has measured the particulate matter emissions of a large number of housing types for poultry, pigs and cows. A special method to measure particles in the exhaust of livestock facilities has been developed. Subsequently with support of Erbrink Stacks Consult a dispersion model has been developed to determine particulate concentration levels around a barn. The dispersion model maps the potential health risks posed by a livestock facility to its surrounding. The outcomes offer policy makers a way to improve local and regional specific policies to minimize the impact of livestock on the people living in or passing through these areas.

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Wageningen Livestock Research creates science based solutions for a sustainable and profitable livestock sector. With our clients, we integrate scientific knowledge and practical experience to develop livestock concepts for future generations.

Wageningen Livestock Research is part of Wageningen University & Research. Our mission is to explore the potential of nature to improve the quality of life. Our strength lies in our ability to join the forces of specialized research institutes and the university in the fields of natural and social sciences. This collaboration leads to scientific breakthroughs that can be put into practice and be incorporated into education. This is the Wageningen Approach.

More information at
www.wur.eu/livestock-research