



Sveriges lantbruksuniversitet
Swedish University of Agricultural Sciences

Future Animal Health and Welfare



2013 **Lifestyle**

– impact on health and welfare



PHOTO: ANNA THUNBLOM

A unifying force

Animal health and welfare are two key areas at the Swedish University of Agricultural Sciences (SLU), and here ongoing studies focus on the needs and behaviours of healthy and diseased animals.

Through the programme Future Animal Health and Welfare, SLU actively gathers and strengthens research in this area and thereby supports society's sustainable relations to animals. The programme raises issues in the field of animal health and welfare in a wide perspective, and serves as a platform for interdisciplinary collaboration. The programme's vision is: *Good health and welfare for animals and humans.*

The activities of the programme include the coordination of major research applications, research projects and international contacts, as well as organizing interdisciplinary seminars. The programme has a particular responsibility for the species cat, dog and horse.

Based on a situational and future analysis, the steering group for the programme has decided to focus on: *Lifestyle – impact on health and welfare.*

Within the initiative Future Animal Health and Welfare promote coordination of projects. A selection of the projects is described in this document.

Lifestyle – impact on health and welfare

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A number of current trends will affect future conditions for animal health and welfare. These trends influence strategic decisions within this research area.

With the world and future in focus

Demographics

A growing population creates competition for existing resources and new demands on food supplies. The conditions for livestock farming are affected by how land use is prioritized.

Increased urbanization places new demands on livestock farming in urban and pre-urban environments. Increased animal density leads to, for example, increased risk of infection. Urbanization also distances people from the livestock farming, which creates new education requirements.

A high population density does not necessarily give individuals a greater sense of belonging. For many people loneliness is a problem and our relationships to pets become important.

Climate change and environmental toxins

Our domesticated animals are a source of greenhouse gases, and thereby part of the climate change problem.

The conditions for the spread of new infectious diseases, including zoonoses, are affected by climate change and increased travel. Climate change can also have implications for animal welfare, for example through starvation, dehydration and heat or cold stress.

Environmental toxins affect the health and not least the reproductive ability.

Economical development and lifestyle

Increased economic welfare changes people's lifestyle and priorities. In countries with high living standards increased problems with health conditions related to lifestyle such as diabetes and cardiovascular diseases, are seen both in humans and animals. Allergies also affect more and more individuals in these areas. This limits in many cases the opportunity to be around animals.

Economic welfare provides the opportunity to invest significant resources in individual animals, which places new demands on veterinary care and broadens the market of products and services for animal owners.

Ethical considerations and priorities

The differences in culture between groups of people, and changes in culture over time can affect animal health, animal welfare and the perception of what these terms means. The complexity is increased further by the fact that animal species are valued differently.

As a consequence of priorities and ethical considerations between countries, diverse guidelines have been created that affect international trade competition. Examples include the production of food, development of medicines and conditions for research. In order to create sustainable systems, good knowledge and international guidelines are required.



Animal husbandry

The subject of animal husbandry includes how we treat the animals in our service. Issues concerning animal husbandry relate in different ways to food producing animals, horses, pets, laboratory animals and circus animals.

Animals' health and welfare are affected by changes in animal husbandry. Development of modern systems, such as large-scale production, organic production, free range systems for horses or day-care and boarding kennels and catteries provide different challenges.

Genetic resources

Low genetic variation within species, as a result of one-sided and often international breeding, creates risks of serious consequences from newly introduced infections, changes in animal husbandry or through impairing the animals' ability to adapt to their local environment. Low genetic variation is also a problem for endangered wild animal species.

Antibiotic resistance

The weapons against bacterial infections are weakened when resistance to antibiotics increases. New knowledge and international strategies are necessary to resolve this situation and create good conditions for health and welfare for animals and humans.

Innovation

New opportunities are continually created within research. An example of this is the increased use of animals as comparative models in studies of human diseases.

Responsible innovation ensures animal and human safety while stimulating the economy. Current areas of development related to animal health and welfare include genetically modified (GM) crops, cloned animals and nanotechnology.

In order to contribute to the vision Good health and welfare for animals and humans, and with regard to the trends presented, Future Animal Health and Welfare focuses on impacts of lifestyle on health. The initiative is divided into 6 focus areas.

Why lifestyle?

The health and welfare of animals and humans are closely linked in many ways. Certain animals share our environment and lifestyle to such a large extent that specific issues concerning, for example healthcare and ethics overlap boundaries between species.

Common lifestyle for good...

Not least the health aspect of exercising has great importance in a society where the negative consequences of a passive lifestyle are gaining increasing attention. Many people also find meaningful recreation in dog, cat and horse ownership. For humans the interaction with sport animals and domestic pets has shown to, among others things, lower the pulse and blood pressure.

... and bad

As with humans, animals have many health problems linked to obesity. Some examples are increased incidence of diabetes, fertility problems and movement disorders. Problems with the musculoskeletal system are seen among animals that perform physical labour.

Our initiative

We keep animals for our own sake, and the development shows that we need to increase our understanding about ethical and sustainable animal husbandry, which also includes how animals are used for work, sport and as domestic pets. In order to curb negative trends and support positive trends and thereby prevent future animal suffering, increased knowledge is needed about the effects of lifestyle on health.

The focus areas of the initiative describe the contact points where the problems associated to lifestyle often overlap between humans and animals. The impacts of lifestyle on health and welfare have been well studied within human medicine. We see this area as very important for future animal welfare. In part because the clear trends of increased problems with lifestyle-related diseases are also observed in animals, and in part because of the opportunity for comparative benefits offered in relation to human medicine.

A comparative approach provides a deeper understanding of how lifestyle factors affect health and welfare. It creates a base for innovative solutions to the threat that lifestyle may represent to our collective health. An initiative in this area contributes to a development in the society for an ethical and sustainable animal husbandry and better health and welfare for both humans and animals.



PHOTO: MICHAEL KVICK

Lifestyle - impact on health and welfare

Interactions
between
humans and
animals

Globalization
and
urbanization

Hygiene,
environment
and climate

Growth and
ageing

Strain and
recovery

Body
condition, feed
and exercise

Interactions
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PHOTO: MICHAEL KVICK

A life together for health and welfare

To be close to

To be physically close to another individual that we have strong ties to not only gives a sense of contentment but also has measurable physiological effects on both humans and animals. Reduced blood pressure and pulse are examples of such effects. This applies as much to parents and children, or couples in love, as to an individual and a beloved animal.

Friends in difficult situations

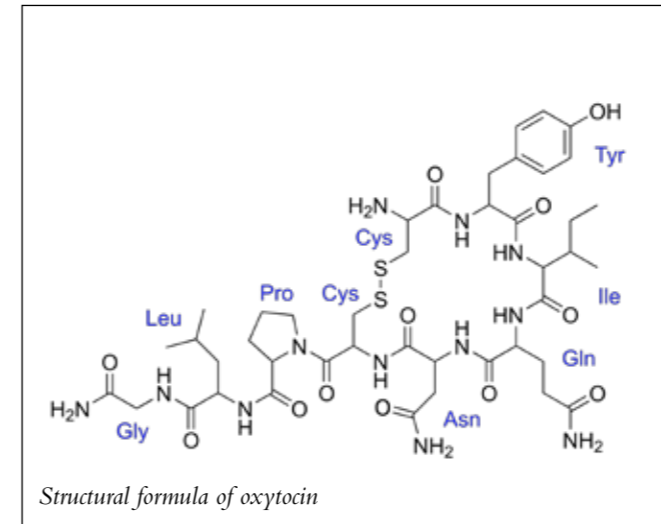
Studies have shown that people who are given the opportunity to spend time with pets cope better with certain difficult situations. Patients suffering from heart attacks have an increased chance of longer survival and pets have a positive effect on people's ability to cope with conditions of chronic illness. The presence of animals facilitates children's recovery in hospital and reduces the suffering and anxiety of dying patients.

Opportunities with responsibility

The interaction between animals and people unfortunately affects certain animals negatively. Since we keep animals for our own sake and in many cases consider animals as a natural part of our lifestyle, we therefore have a responsibility to maintain good animal husbandry, both for livestock producing animals and pets. In order to know what constitutes good animal husbandry we require reliable measurements for animal welfare.

Working with animals

One context where the lifestyle of people and animals greatly affect one another without really being equal is when people work with animals. Working with animals is often physically challenging, both in a positive and negative sense. The physical challenge of riding for example can be used as physiotherapy but there are situations where work with animals results in stress and strain injuries and illness.



The link between animal and human health

When humans interact with one another in a positive way oxytocin is secreted. Oxytocin is both a hormone and a neurotransmitter in the brain. The release of oxytocin induces tranquility and stimulates social interaction, it also reduces activities in the body's stress system and stimulates healing processes. The release of oxytocin is activated by sight, sound, smell and not the least touch. When the release is induced through touch the stress relieving and healing effects are especially powerful. Research at SLU has also shown that interaction between dog owners and their dogs releases oxytocin and triggers soothing effects. The consequences of interaction and touch between animals (dogs, horses and cows) and humans (autistic children, adolescents with behavioural disorders and the elderly) have also been studied. In all the studies positive effects were documented in the surveyed individuals.

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What does the dog do when it is home alone?

In one study, researchers at SLU observed dogs that displayed no separation anxiety and posed the question whether the length of time spent at home alone affected the dog's welfare? Regardless of the length of time the dogs were left alone (0.5-4 hours), it was found that the dogs rested for the majority of the time (95-97%). They were not, however, unaffected by how long they were left alone. After prolonged separation the dogs were more active, contact seeking, waved their tails and licked their lips more frequently when reunited with the owners. The study was part of a larger project about dog welfare in today's modern society. SLU is carrying out research on several aspects of the interaction between dogs and humans, with a particular focus on the experience and welfare of the dog.

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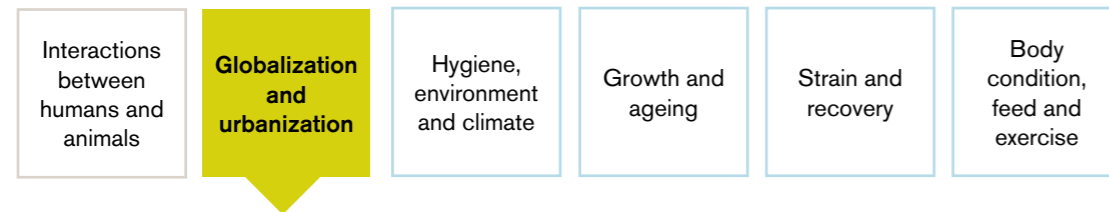
PHOTO: THERESE REHN



Risk-based assessment of animal welfare

Because EU legislation requires member states to make public animal welfare control risk-based, the European Food Safety Authority has developed methods for risk assessment in animal welfare. The SLU project RAWA (Risk-based animal welfare assessment) has evaluated different methods to assess the animal welfare risks for Swedish livestock and classify different types of animal facilities according to risk. A survey and assessments carried out by 55 experts including farmers, government authorities and academics, as well as control results in four counties over a one year period, were analysed. In certain types of animal husbandry the risk for inadequate animal protection and welfare was considered to be very high.

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Globalization and urbanization affect the lifestyle of animals and people

As people's lifestyle changes the lifestyle of domesticated animals is also affected. Two trends where this is evident across the world are globalization and urbanization.

Our small big world

Globalization is often referred to in terms of new and improved conditions for international trade and investment, exchange of labour and technology etc. Conditions have changed as a result of the significant improvements in communication and transport over the last century.

Also lifestyle, culture, environment, attitudes and beliefs have been changed by globalization, which again affect animal husbandry worldwide. For example, we travel more with our sport and domestic animals and the transport of live animals for food production increases the risk of imported infections that countries have previously been protected from.

Varying ethical standpoints and guidelines in different countries affect, for example, the opportunities for research and also the competitiveness of food production.

Genetic resources

Due to the good conditions for international trade and transport coupled with high technological development, the same genetic material is today used for high-producing production animals worldwide, which makes the production system sensitive to changes in, for example, environment and infection profile.

Joint international projects for the conservation of genetic resources are conducted for both domesticated and wild animals.

Living closely...

Urbanization has a broad impact on our animal husbandry. Also, animal husbandry in urban environments affects diverse sectors of society such as town planning and small businesses. Modern Swedish animal husbandry in urban environments has led to a new niche in small businesses where dog and cat day kennels and boarding are becoming evermore common.

In the city, the demand for green areas is high and grazing animals kept near the city, such as horses and sheep, are both an asset and a challenge to urban residents.

... and far away

Our cities are the homes to hundreds of thousands of domestic pets and most people in the society are familiar with these animals. The distance to the animals that contribute to our food production, however, is increasing for most people. The fact that the average person often has a poor understanding of agricultural production methods means that there is a need for an increase in education and information concerning for example beef, pork and poultry production.



PHOTO: INGRID SARLÖV-HERLIN

Urban farming

Since 2008, cattle grazing has been used in the recreation area of Bulltofta Park in north-eastern Malmö as part of the ecological park management. In such an urban location the introduction of grazing animals can be expected to cause conflicts. In a study conducted at SLU, the attitudes of visitors and residents towards the grazing project and the animals in the park were examined during the first grazing season. The study showed that the acceptance of grazing animals increased with time and that an involvement by the residents developed where they monitored potential vandalism. The introduction of grazing animals in Bulltofta Park has not only been a means to avoid lawn care with motorized lawnmowers but also created a greater interest in issues of sustainability and nature in the city.

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The cat as a model animal for endangered species

Despite the efforts made to preserve endangered cats in their natural habitat, the number of individuals in many species has continued to decline. Although natural reproduction is generally preferred, it has often proved difficult to breed cats in captivity. For this reason, research is underway in many parts of the world to preserve the genes of endangered species in gene banks. The domestic cat has proven to be a suitable model for its wild animal relatives as regards basic understanding of how best to preserve sperm and embryos. With the help of frozen sperm, genetic material can be preserved for an almost unlimited time. Freezing does, however, cause damage to the sperm cells, leading to a decline in their ability to fertilize. By studying sperm function and various methods for improving the freezing process, SLU is working to optimize the chances of offspring when using genetic material stored in gene banks.

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PHOTO: EVA AXNER



PHOTO: JAN-ERIK LINDBERG

Feed for food-producing animals in urban environments in Uganda

Lack of feed is the main limitation to animal production in urban areas in Uganda, largely due to scarcity of land that in turn limits farming opportunities. Purchase of feed from the outside is not an option for resource-poor households. Instead, households must rely on access to various kinds of waste products that can be used as feed for animals. The quantity and quality of these potential food resources vary and are often not sufficient to provide an adequate production. The goal of one of SLU's projects is to identify, quantify and nutritionally determine available feed resources in urban environments near Kampala, Uganda. This is undertaken in close collaboration with researchers at Makerere University in Kampala. The collected data will be used as the basis for composing nutritionally balanced feed for pigs, poultry and dairy cows.

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PHOTO: MICHAEL KVICK

Changing conditions – due to, and threatening, our lifestyle

Animals as environmental indicators

The animals that live in close contact with humans can in certain cases act as indicators for changes in the environment, for example through sensitivity to increased levels of specific environmental toxins in our local environment. Since development of serious health conditions such as certain forms of cancer is linked to environmental toxins this is important for both human and animal health.

Animals and humans are affected in many ways by the substances that are released into nature. Not least the ability to reproduce is affected, for example, lower quality and quantity of reproductive cells and in certain species the sex distribution in offspring is altered. In this context wild animals have proved to be an important resource by providing information about the environmental impact.

Climate and new infections

Besides the direct impacts in parts of the world through for example droughts and famines, war-

mer climates provide conditions for infections and infection carriers, so called vectors that establish themselves in new areas. In our part of the world, this could mean infections spread via mosquitoes or ticks that could not previously overwinter in the northern latitudes. These effects are magnified by increased travel that contributes to the transport of both infections and vectors.

Crack in the shield – antibiotic resistance

Not only new infections pose threats to animal and human health. Also bacteria that develop resistance and resilience against antibiotics are a growing human and animal health problem. Resistant bacteria impede the treatment of bacterial infections and could ultimately increase the infection risk during cancer treatment, transplants and operations.

Antibiotic resistance has arisen as a result of an overuse of antibiotics, and resistant bacteria are spread through increased travelling by humans and animals.

Dynamics of voles, predators and zoonotic pathogens in a climatic gradient

SLU monitors and analyses population dynamics of small rodents and the model predator boreal owl, as well as the occurrence of zoonotic pathogens that can be transmitted to humans from rodents. The studies are undertaken along a natural climatic gradient from the coast to the mountains in Västerbotten, northern Sweden. The aim is to assess the long-term effects of ongoing climate change, with for example milder winters, on rodents, their predators and zoonoses. The Puumala virus, that causes nephropathia epidemica in humans, is used as a model pathogen.

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PHOTO: MAIK MEID/WIKIMEDIA



PHOTO: NICOLAI MEYER/WIKIMEDIA

The wild mink as an indicator of reproduction disturbing chemicals in the environment?

Many of the chemicals that are spread into the environment by man have been shown in animal experiments to impair reproduction. One project at SLU explores the possibilities of using the wild mink, an animal high up in the food chain that is widespread and hunted all over Sweden, as an indicator to measure chemical contaminations in the environment and to monitor their potential effects on the reproductive system.

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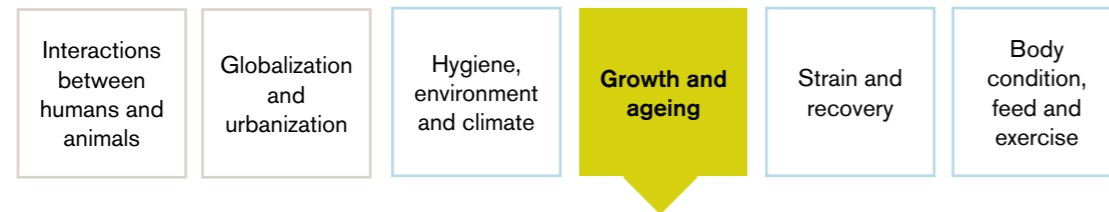
MRSA in horses

Antibiotics were discovered at the beginning of the last century and have saved countless lives. Modern healthcare is entirely dependent on functioning antibiotics. Their overuse has turned antibiotic-resistant bacteria that infect humans and animals into a growing global threat. The situation is relatively good among animals in Sweden, but due to an outbreak of methicillin-resistant *Staphylococcus aureus* (MRSA) in horses in 2008, SLU initiated research on MRSA and hygiene in veterinary hospitals. The aim is to prevent hospital infections in general and MRSA in particular. Routines to prevent the occurrence of hospital spread infections, as well as guidelines for antibiotic use, have also become necessary in horse care.

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MRSA on chromagar
PHOTO: KARIN BERGSTRÖM



To grow up and age in health and welfare

Growth and aging are common to most multi-cellular organisms. This is definitely the case for humans but also for species that for generations have not been able to age due to harsh living conditions or because they are slaughtered at a relatively low age. The individual species has different and specific needs at different life stages. This regards energy and nutrient intake, but also affects which health conditions that may arise.

To grow up...

The needs for upbringing and growth vary between different domesticated species, largely due to the roles they have in relation to humans. For certain species we aim to create a high growth to rapidly meet reproductive maturity or planned slaughter weight. For other species where the aim is durability for work and long-term companionship, a significantly lower growth rate is desired.

Despite these differences there are also many similarities between young individuals in different species. Research has made great progress by studying the physiological processes in many species and thereby created good model systems and increased the understanding of basic mechanisms.

This comparative approach also allows background studies of the different health conditions, which leads to improved diagnosis and methods of treatment. A continual development of diagnostics and treatment methods is essential for good animal welfare.

... and grow old

Why we age has interested people for thousands of years. Today the pieces are beginning to fall into place but there is still much more about the aging process that researchers seek to understand.

How old an animal or a human being has the potential to become is perhaps most interesting when it is linked to the quality of life. It is therefore of interest to the public as much as to researchers that we find out more, not only about how aging works, but also how we, and the animals we live close to, can live our lives as healthy and as contentedly as possible. It is for example known that there is a correlation between body condition, exercise and aging, as well as the risk of developing illnesses.



PHOTO: MICHAEL KVICK



PHOTO: ÅSA VILSON

Probiotics for dogs during gestation and early in life

The presence of immune-related diseases (diseases caused by abnormal activity in the immune system) has increased in both humans and dogs in recent decades. A possible explanation for this is our decreased exposure to microorganisms in our environment. The bacteria that colonize the intestinal tract early in life affect the maturation of the immune system and this has lifelong consequences. Here probiotics are of particular interest. Probiotics are living microorganisms that have healthy effects on the host and are safe to use. These microorganisms are of interest because they potentially can be used to build the immune system and thereby prevent immune-related diseases. In humans, it has been found that the addition of probiotics during pregnancy and early childhood has positive effects on the infant. In dogs, this is a relatively unexplored area and SLU is now researching whether the addition of probiotic supplements early in life are also beneficial for dogs.

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Heart disease in different life stages of dogs and cats

Heart diseases that develop after birth are known as acquired. In dogs, the most common of these is chronic valvular degeneration, which usually occurs in middle-aged to old dogs of small to medium sized breeds. The most common acquired heart diseases in large breeds of dogs and in cats are in the heart muscle itself. In dogs, the most common heart muscle disease that occurs is dilated cardiomyopathy and in cats, it is hypertrophic cardiomyopathy. At SLU these disease are the focus of ongoing research. The importance of heredity in the development of the disease has been studied in a number of different dog and cat breeds. The results show specific areas of the genome in different breeds that are linked to disease progression, but also non-genetic factors can have an influence. Research is ongoing to identify these factors and how they work. In order to detect disease, good diagnostic methods are required. Research run at SLU aims to introduce and evaluate such methods. A large part of the research is clinical trials on medical products for dogs and cats in order to improve the treatment of diseased animals.

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Ultrasound image of a dog with dilated cardiomyopathy PHOTO: JENS HÄGGSTRÖM



PHOTO: WIKIMEDIA

Aging yeast. All living organisms age

Experiments in yeast, worms, insects and mammals have shown that a genetic programme controls aging. The mechanisms are not yet clear, but starvation slows the aging process in the organisms studied. There is therefore a strong link between metabolism and aging. Changes in genetic material that alters the organism's awareness of nutrient availability extends longevity. It is not starvation itself, but perceived starvation, which slows down the aging process. Another way to achieve the same effect is through the use of rapamycin, a substance produced by a microbe found on Easter Island. Rapamycin shuts down one of the signal pathways that senses the availability of nutrients and thereby delays aging. Gene regulatory proteins that act downstream from these signal pathways in yeast, where it is particularly easy to use genetic methods, are studied at SLU. A better understanding of how aging works in yeast will also increase our understanding of the aging process in animals and humans.

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« Rapamycin was discovered on Easter Island

Young trotting horses long-term health and performance

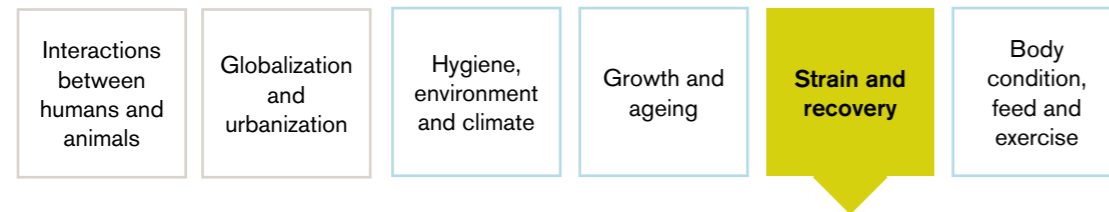
Nearly 70 % of Swedish trotters undergo an approved standardized race as two-year olds, but the dropout after this is large and only 30-40 % of the three-year olds are able to compete. Health problems constitute the most common cause of dropout. In the autumn of 2010, SLU started a unique, international three-year project in which the long-term health and performance of young trotting horses were studied under standardized conditions over three seasons. The project aims to investigate the potential of young horses reaching race start on a diet that best promotes horse health (with forage diets and without starch-rich concentrates) and whether a reduced amount of training around the lactic acid threshold (where lactic acid accumulates in the muscles) can lead to better health and performance. Sixteen young horses stabled at Wängen are included in the study, which is a joint project with SLU, the Wängen National Centre for Education in Trotting and a number of foreign researchers.

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View from Wängen

PHOTO: ANNA JANSSON



Effects of strain and recovery on health and welfare

Stress

Stress occurs in many contexts and is not always negative. Stress prepares the body for physical activity and normally an individual is capable of coping with a certain level of stress without problem. However, extreme or persistent stress can have long-term negative consequences.

Stress reactions have had a crucial evolutionary role and are therefore well conserved between species. Just as with humans we see the negative effects of stress in our domesticated animals. Stress can lead to deteriorated welfare through both mental and physical suffering. One example is infectious diseases linked to stress and an increased infection pressure that can be seen when animals are kept in large groups. This is a recurrent problem with many types of animals. The factors that lead to stress can be physical, social or psychological. Stress hormones are released in very different contexts such as under-stimulation, fear or during surgery.

Physical strain

Joint problems and other movement disorders due to physical strain occur in animals and humans. These problems can be caused by obesity, but are also identified in animals with appropriate body fat that have been exposed to hard labour, such as working dogs and sport horses.

Sleep...

Sleep and the quality of sleep affect our physical health as well as our mental balance. One contributory reason for this could be that good sleep effectively counteracts stress.

Sleep is essential for animal and human ability to perform, both mentally and physically, and constitutes a major part of the body's recovery between activities.

... and other forms of recovery

Recovery is comprised of much more than sleep and rest. Studies have shown that physical activity counteracts stress and is therefore a form of recovery for the body. Recovery is traditionally seen as a restoration of glycogen in the muscles, replacement of lost fluids, and salt balance after physical exercise.

Since we are keeping an increasing number of animals for sport, both at elite and amateur levels, research on physical recovery is important in regard to horses and dogs for example. Physical performance is however not limited to the practice of sport. Some of our production animals, including high-lactating dairy cows, perform a very heavy physical labour despite moderate activity levels. These animals do not have a resting period for several months, which means that recovery must take place continually during production.



PHOTO: JULIO GONZALEZ



PHOTO: JANN LIPKA

Sleep in dairy cows

Two of the main problems affecting animal welfare and farm economy in dairy production are mastitis and metabolic disorders related to the period of negative energy balance post partum. One factor that may contribute to these problems is lack of sleep in high yielding cows. In an on-going research project a non-invasive EEG-technique that distinguishes between different degrees of wakefulness and sleep has been validated for cows. Preliminary results suggest that cows sleep around 2.2 hours per day, divided in 10 minute periods. The longest sleep time is seen in late pregnancy and the shortest in early lactation. Current research in this project is investigating the difference in sleep time between lactation stages, effects of milk yield, interactions between sleep and hormones that control milk production and effects of light and dark on sleep patterns. In addition, all the collected data will be used for suggesting a tool for evaluating whether commercial management systems allow opportunity for sufficient sleep.

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Stress in cats

How does stress affect the behaviour, physiology and incidence of disease in cats? We currently know that there is a correlation between group housing, the number of individuals in the group, stress and diseases in cats. SLU's project 'Stress in Cats' includes a survey of animal shelters in Sweden, followed by studies investigating the relationship between group housing, stress and incidence of disease. The behaviour of cats is studied in environments with different resources (such as sleeping shelves and hides) and links will then be examined between behaviour and measurable physiological stress. The aim of the project is to investigate which environmental factors cause unnecessary stress, and what measures can be taken to reduce stress and incidence of disease among cats in groups.

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PHOTO: MICHAEL KVICK



PHOTO: ANNA BERGH

Treatment of pain and injuries in joints and muscles

Levels of physical stress that are either too low or too high can lead to pain and loss of function. There is a great need for reliable methods to diagnose and treat pain and injuries in joints and muscles. At SLU different examination and treatment methods are continually evaluated. Examples of therapies under study are acupuncture, electrical muscle stimulation, magnetic therapy, and physical training. Data has been collected from healthy horses and dogs that show normal values in tests such as behaviour and pain measurement, sensitivity to pressure, joint angles, movement symmetry, functional testing and blood tests. For comparison, clinical studies are currently underway using data collected from horses and dogs with well-defined pain conditions.

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Stress and pain related to surgery

In all forms of surgery the prevention of bleeding is important. To prevent bleeding, a surgical suture can be tied around blood vessels, a so-called ligature. In surgical procedures such as the removal of the ovaries, there is a risk of bleeding both during and after surgery. After abdominal surgical procedures, haemorrhages can be difficult to detect, leading to serious consequences. It has been shown that the risk of bleeding following castration is greater in large dogs, where the distance from skin incision to the ovarian vessels are longer compared to smaller dogs. Surgical procedures are also linked to pain. Ligating the ovarian blood vessels in a safe manner, using a method that minimizes tissue handling and thereby reduce postoperative pain would be advantageous. The aim of SLU's studies in this area is to produce a self-locking resorbable medical device for safe ligation of blood vessels, and to develop methods to assess different surgical techniques by measuring stress reactions during surgery.

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Ligation of blood vessels

PHOTO: ODD HÖGLUND

Interactions
between
humans and
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and
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and climateGrowth and
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PHOTO: EDWIN ANAGRIUS

Body condition, diet and exercise for health and welfare

Obesity

The so-called obesity epidemic is not only a problem for humans. As many as 30 % of Sweden's approximately 1.2 million cats and 700,000 dogs, are estimated to suffer from conditions associated to overweight. As with humans, there are different problems associated with obesity in animals. For example, diabetes is one of the most common hormonal diseases affecting cats today, and metabolic syndrome is often found in overweight horses.

Malnutrition

In high-performing animals and for a growing part of humanity the problem is instead a negative energy balance resulting in reduced production or starvation. There is also a clear link between body fat and fertility.

The way forward

Extensive studies of body condition, diet and exercise, and diseases associated with these parameters are necessary to counteract increased ill health. A comparative approach leads to an improved understanding of the basic mechanisms behind the different problem areas.



PHOTO: BJACO18 / EN.WIKIPEDIA

Diabetes in cats

Diabetes mellitus is a disease that has increased in both cats and humans in recent decades. Obesity and inactivity increase the risk of developing the disease. In cats, there is a higher risk among older, neutered male cats, but there is also a marked breed variation. Diabetes in cats is similar to type 2 diabetes in humans, formerly known as adult-onset diabetes. In this type of diabetes, insulin sensitivity in muscle and fat cells is impaired, a condition known as insulin resistance. SLU researchers are working to improve the diagnosis of insulin-resistant diabetes mellitus in cats, by studying the interaction of insulin, growth hormone and IGF-I (Insulin-like growth factor I). These studies provide the opportunity for early diagnosis and improved treatment. Researchers are also studying the breed, gender and age predisposition as well as the correlation with other diseases and underlying genetic factors.

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« Burma is a breed with a relatively high frequency of diabetes.

Body condition and fertility in cows are related - but how?

Both obesity and lack of energy can negatively affect cows' fertility and embryo development. This leads to changes in insulin blood levels, and insulin regulates many important bodily functions. Dairy cows go through stressful changes in energy metabolism during different phases of life. High milk production requires large amounts of energy and reduces the animal's body fat, however, cows have a tendency to become too fat as milk yields decline. SLU is researching how oocyte quality and early embryo development in cattle is affected at the genetic level by changes in insulin levels. The aim is to improve cow fertility and thereby farmers' economy. The research is also relevant for comparative studies since humans are also exposed to abnormal insulin levels during illness (e.g. diabetes) or obesity.

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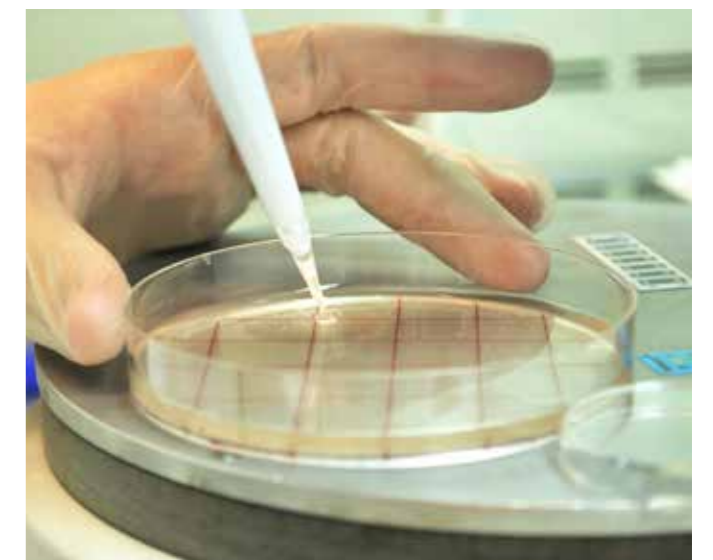


PHOTO: ALEJANDRO RUETZ



PHOTO: JEAN-POL GRANDMONT/WIKIMEDIA

Metabolic syndrome in horses

Metabolic syndrome in horses is characterized by insulin resistance, a condition in which insulin in the body cannot, or only ineffectively, lower glucose levels in the blood. Other characteristics are; local or general deposits of body fat and an increased risk for developing the disease laminitis. Local deposition of fat is often visible around the horse's neck. Understanding how metabolic syndrome develops in horses is currently very limited. It is known that adipose tissue is not only an energy storage site but also has an active role in the inflammatory response and in the regulation of metabolism. A project at SLU is studying how obesity and high insulin concentrations lead to the development of insulin-resistance in horses. The treatment of metabolic syndrome in horses aims to reduce insulin response after feeding and increase weight loss. The project studies how forages with different sugar levels affect these factors. The knowledge gained will be used to improve feeding guidelines for horses that have been, or are, at risk from developing metabolic syndrome.

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Is obesity in dogs linked to inflammation and altered intestinal flora?

Several studies have shown that obese animals and humans have an altered intestinal flora and increased levels of inflammatory substances in the blood. It is therefore possible that obesity, intestinal flora and inflammation are associated factors. The main goal of the project at SLU is to examine whether there is such a relationship and explore the cause and effect. The presence of various inflammatory markers and intestinal bacteria in samples from obese and normal-weight dogs of the same breed will be analysed. The project will also study the possible links between metabolism, inflammation levels and intestinal flora in dogs. These studies will hopefully contribute to the understanding of the mechanisms that are important for the development of obesity in dogs. The results can contribute to more effective methods of prevention and treatment of obesity and improve health in both dogs and humans.

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Escherichia coli is one of many species of bacteria present in the intestines »

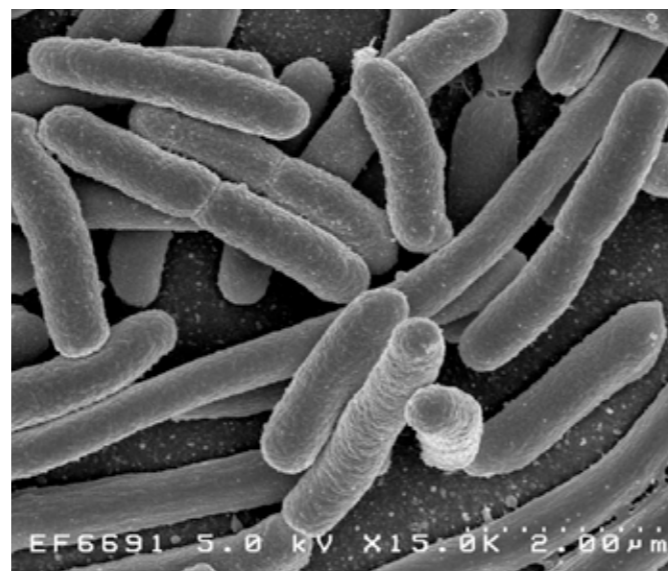


PHOTO: ROCKY MOUNTAIN LABORATORIES



SLU has created a strategic programme to provide favourable conditions for research on animal health and welfare.

From idea to action

Background

The programme Future Animal Health and Welfare was started in the spring of 2011 as a result of the evaluation of SLU's quality and impact, which was implemented in 2009 (KoN 09). In this evaluation, the benefits of gathering and strengthening SLU's research and making it more visible to the outside world was highlighted among others. Future Animal Health and Welfare was given a particular focus on sport and domestic animals and their importance to mankind in the future.

Aims

Future Animal Health and Welfare initiate, lead and coordinate research and development for all animal species, with special responsibility for cat, dog and horse, in order that:

- Good health and welfare for animals and humans is achieved
- SLU can carry out world-leading research within the area of animal health and welfare
- SLU can contribute to society's development of sustainable relationships to animals

In this document there are examples of research projects conducted at SLU. For a more comprehensive overview of animal research at SLU, please refer to the three framework programmes for research on farm animals, horses, dogs and cats, developed at the Faculty of Veterinary Medicine and Animal Science. These documents, as well as SLU's strategy for 2013-2016, can be downloaded from the programme website www.slu.se/framtidsdjur.



PHOTO: JENNY SVENNÄS-GILLNER

Contacts

The steering committee for the programme consists of seven senior researchers and a programme secretary all of whom work with animal health and animal welfare from different perspectives:

Associate Professor Bodil Ström Holst, Programme Director, Department of Clinical Sciences

Professor Jan Erik Lindberg, Assistant Programme Director, Department of Animal Nutrition and Management

Professor Göran Andersson, Department of Breeding and Genetics

Professor Eva Brännäs, Department of Wildlife, Fish and Environmental Studies

Professor Bengt Guss, Department of Microbiology

Professor Linda Keeling, Department of Animal Environment and Health

Professor Ingrid Sarlöv Herlin, Department of Landscape Architecture

PhD Malin Hagberg Gustavsson, Programme Secretary, Department of Clinical Sciences

For more information about the programme visit

www.slu.se/framtidsdjur or contact us via

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By investing in animal
health and welfare research,
we create a healthier society

