

COUNCIL ON ANIMAL AFFAIRS

ANIMAL WELFARE IN  
CIRCULAR AGRICULTURE  
SUMMARY

## The purpose and activities of the Council

The Council on Animal Affairs (*Raad voor Dieren-aangelegenheden*, RDA) is an independent council of experts, which advises the Minister for Agriculture, Nature and Food quality of the Netherlands. This advice is submitted on request and by the Council's own initiative regarding complex, multidisciplinary issues relating to animal health and welfare. The RDA currently comprises some forty experts with a wide range of backgrounds and expertise, who serve on the Council in a personal capacity, independently and without any outside influence.

The Council on Animal Affairs considers issues across the entire spectrum of animal policy: on captive (“domesticated”) and non-captive (“wild”) animals, smallholding, or hobby farm animals, companion animals (pets), commercially raised animals and laboratory animals.

The Council records the conclusions of its deliberations in opinions. These documents provide an overview of the scientific and societal background to various issues, and include recommendations on policy options and avenues for resolving potential problems. Consensus is not a requirement for the inclusion of opinions; an opinion may contain views held by a minority of Council members.

## Preface

The government wants the Netherlands to become a leader in circular agriculture, in which the use of raw materials and resources from elsewhere is kept to a minimum. According to the RDA, animals play an important role in circular agriculture. With the upgrading of residual streams to high-quality proteins, animals will become an essential link in the chain in the years ahead. The health and welfare of animals are important factors in this respect and will become increasingly important, as the RDA argues in its report ‘The State of the Animal in the Netherlands’. However, the improvement of animal welfare will not occur automatically. In our view, the transition to a circular agriculture may have positive as well as negative implications for animal welfare.

The RDA has therefore taken the initiative to draw up this advisory report based on the central question: “*What implications will the transition to circular agriculture have for animal welfare?*”

Various experts were consulted when drafting this advisory report, during separate interviews and in a joint session.

In circular agriculture, production animals are primarily used as processors of residual streams and grass, and the quality and use of manure play a key role. Circular agriculture can bring about a change not only in the food animals eat, but also in animal housing and production levels. In this advisory report, the RDA explores the consequences of this system change for the welfare of production animals, in the hope

that this will provide a basis for protecting and improving the welfare of production animals during the transition to circular agriculture.

The RDA recommends utilising the period ahead – in which the transition to circular agriculture will be shaped – to take a number of necessary steps to protect and improve animal welfare.

The ambition to become a leader in circular agriculture calls for a major transition. Let us jointly seize this opportunity to put animals first and to move forward in building a humane livestock farming sector.

This publication contains an abridged version of the advisory report. The full version can be downloaded from the RDA's [website](#).

The Hague, May 2020



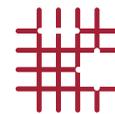
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# Animal welfare in circular agriculture

## Independent advisory report

**Question:** In Minister Schouten's Vision for the Future (September 2018), the Dutch agricultural sector needs to transition to circular agriculture. The RDA has wondered what the transition will mean for farm animals (production animals). This begins with the question: what exactly is circular agriculture? Do farm animals play a role in it and, if so, what would the consequences of circular agriculture be on those animals? Should we be concerned about animal welfare in circular agriculture? And what action needs to be taken to protect and further improve animal welfare in circular agriculture?

**Background:** Minister Schouten's vision for circular agriculture barely touches on animal welfare. The RDA has drawn up this advisory report to identify the possible implications of the transition to circular agriculture for the health and welfare of production animals. The advisory report was prepared by an RDA working group chaired by Imke de Boer, professor of Animal Production Systems at Wageningen University & Research. "Animals certainly have a function in circular agriculture, we quickly agreed on that," she explains. "Animals can utilise and convert residual streams from the food system (such as crop residues and by-products from the food industry) and grass into high-quality food, and thus utilise nutrients and carbon that would otherwise be lost to our food system.

In addition to food production, these animals (particularly ruminants) can also contribute to other ecosystem services, such as maintaining the landscape or biodiversity, and improving soil quality. The implementation of the concept of circular agriculture will have consequences for the structure of the livestock farming sector and the welfare of production animals. By identifying these consequences now, the RDA aims to ensure that animal welfare will be allocated a role in the transition to circular agriculture.



Imke de Boer, working group chair

**Considerations:** "The guiding principle of the RDA is always 'production with respect for animal welfare'. Animal welfare is the quality of life as experienced by the animal itself and encompasses more than animal health alone", explains De Boer. The working group identified the animal welfare concerns in circular agriculture during meetings and interviews with experts and by performing a literature review. "It has emerged from our research and our interviews with experts that more attention needs to be paid to the consequences for animal welfare; moreover, circular agriculture may have positive as well as negative implications for animal welfare", says the working group chair. "Having more and new residual streams will improve the utilisation of natural resources, such as land and rainwater, but in terms of processing and collecting and during quality control, it also means that we will need to think in cycles. For the safe use of swill and slaughter by-products, for instance, we need to ensure that these raw materials are processed in such a manner that they do not pose any health risks to humans, animals and the environment."

In this advisory report, the RDA has identified the physical, chemical and biological risks of the use of residual streams. “We have also looked at the nutritional quality of residual products”, says De Boer. “The feed formulation will need to be adjusted if we intend to use more residual streams from the food industry and more crop residues from arable farming. Another aspect that we would like to highlight is that the production level and breed of farm animals will probably change: a dairy cow that eats more grass and fewer concentrates will produce less milk, while a pig fed with more residual streams will grow at a slower pace. Animal breeders also have a role to play here; more robust animals will probably be able to cope more easily with the changes involved in the transition to circular agriculture. Moreover, more robust animals are expected to be more resistant to production-related health problems, so we can create a win-win situation here.”

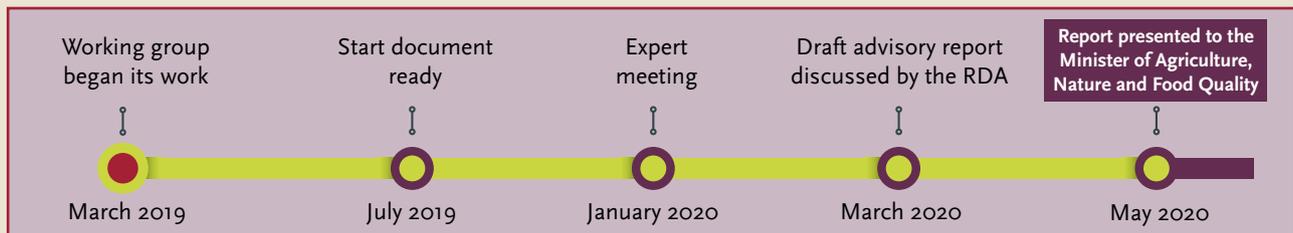
In an agriculture system that closes cycles as far as possible, focus should furthermore be placed on the quality and application of livestock manure. Housing systems, in which manure and urine are captured separately, can contribute in this area because it is easier to process separate products into valuable fertilisers. Outdoor access, where some of the manure is also deposited, may therefore need to be redesigned, De Boer observes. All of these aspects of the transition to circular agriculture merit attention. “We will ultimately need to design farming systems for the various production animal categories that do justice to the principles of circular agriculture and animal welfare”, she concludes.

**Recommendations:** The Council on Animal Affairs recommends putting animal welfare (including animal health) first in the transition to circular agriculture and to utilise the transition to move forward in building a humane livestock farming sector.

The time required to develop the concept of ‘circular agriculture’ can be utilised to take a number of necessary steps to protect and improve animal welfare. The RDA would like to contribute to developing, gathering and sharing the knowledge required for this purpose. “We would like to involve representatives from the government, the business sector and NGOs in this”, explains the working group chair.

In order to develop circular agriculture that takes animal welfare into consideration, the RDA recommends appointing an advisory committee – consisting of various stakeholder representatives – to promote animal welfare in circular agriculture. This advisory committee can formulate animal welfare aspects for the research agenda, identify parameters for monitoring animal welfare and advise on institutionally protecting animal welfare both within and outside the Netherlands.

A centre of expertise for animal welfare can serve as a source of information and a platform for exchanging knowledge; this is essential for entrepreneurs who want to embark on the transition to circular agriculture. Furthermore, the RDA advocates investing in research focusing on animal welfare in circular agriculture. In addition, it is important to strengthen and improve networks within Europe to create a broad support base for protecting and improving animal welfare in circular systems.



# Circular agriculture

The Netherlands is seeking to transition to circular agriculture. Animals play a significant role in this because they convert grass and residual streams from our food production into high-quality food and manure. But what are the consequences of circular agriculture for animals? Does circular agriculture have positive or negative implications for animal welfare? Do we have a sufficiently clear picture of this?

## What is circular agriculture?



This is a sustainable agriculture in which food is produced while maintaining ecological values, like a fertile soil, clean air, clean water, a healthy climate, quality of landscape, nature and biodiversity.

## Feeding of residual streams



### Risks:

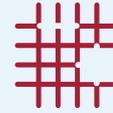
- Residues in animal feed
  - Physical - plastic, soil
  - Chemical - mycotoxins
  - Biological - Foot-and-mouth disease, classical swine fever, BSE
- Lower nutritional value
- Different digestibility (risk for bowel disease)
- Less consistent quantity and quality



### Opportunities:

- More feed variety
  - Less boredom
  - Less harmful behaviour
- Less health problems at a lower milk production level





## New animal housing systems



### Risks:

- Resulting from reduction of nutrient losses
  - Poorer stable climate
  - Less outdoor access
- Diseases related to outdoor access
  - Bird flu
  - Tetanus
  - Liver fluke



### Opportunities:

- Better stable climate by early separation of manure and urine
- More outdoor access
  - More natural behaviour
  - More variation in their environment

## Suitability of animals



- Ability to convert residual streams and grass efficiently into high-quality food?
- Able to deal with feed of a fluctuating quality and quantity?
- Modern breeds also the most suitable for a lower production level?
- Need for other animals (e.g. insects)?

## Recommendations



- Put animal welfare first in the transition to circular agriculture and move forward in building a humane livestock farming sector.
- Utilise the transition time to secure and improve animal welfare:
  - Invest in a research agenda
  - Set up a Centre of Expertise for Animal Welfare
  - Appoint an advisory committee for animal welfare in circular agriculture
- Strengthen the network and coordination in Europe in order to develop circular agriculture with attention for animal welfare in a European context as well.

# Brief summary of the advisory report

## Introduction

In her vision document 'Agriculture, nature and food: valuable and connected' (LNV, 2018), the Minister of Agriculture, Nature and Food Quality, Carola Schouten, states that it is essential for the Netherlands to transition to circular agriculture. The RDA has noted that, in the considerations on circular agriculture, insufficient light has been shed so far on the consequences for animals. Despite the increasing attention paid

to animal welfare in recent years, that attention often seems to be lacking in the discussions on circular agriculture. This has prompted the RDA to take a closer look at the possible effects of circular agriculture on animals.

The central question in this advisory report was: *"What implications will the transition to circular agriculture have for animal welfare?"*

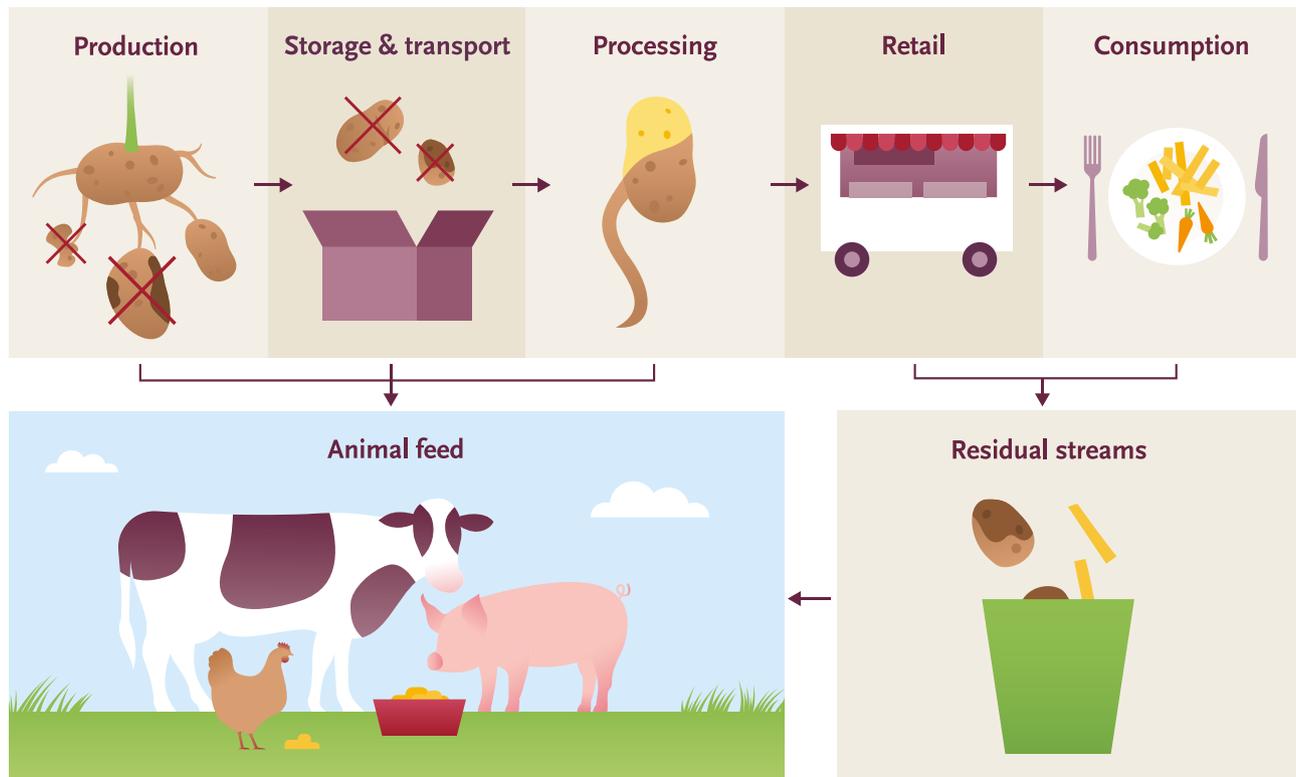


Figure 1 Residual streams occurring in the food value chain.

In Denkkader Dierenwelzijn (Conceptual Framework Animal Welfare, RDA, 2018), the RDA states that not only animal health but also the opportunity to display species-specific behaviour and the emotional status of the animal are important for animal welfare. *“Animal welfare is the quality of life as it is experienced by the animal itself” (Bracke et al., 1999). An animal will experience a positive state of well-being if it is free to engage in normal behaviours that are typical of its species and if it is able to respond effectively to the challenges posed by the circumstances in which it finds itself.* We have used this definition of animal welfare in our advisory report.

## Circular agriculture

The aim of the cycle concept is to preserve and manage natural resources for future generations and, in a strict sense, it focuses on the **ecological dimension** of sustainability (De Boer and Van Ittersum, 2018). However, circular agriculture should also be economically viable (the **economic dimension** of sustainability) and socially responsible (**social dimension** of sustainability). In this model, animal welfare is an element within the social dimension of sustainability rather than within the ecological dimension. This implies that animal welfare does not automatically form part of the circular agriculture and that good animal welfare practices (including animal health) should be a separately formulated and monitored requirement for the development of circular agriculture.

## Feeding animals

An important aspect of circular agriculture for animals is the larger share of residual streams from food production and food consumption in what they eat. These residual streams occur in each step of the food value chain (Figure 1). What does the use of these residual streams mean for animal health, species-specific behaviour and emotional status (feeling hungry, satiation, boredom and a positive state of mind)? We have found that the increasing use of residual streams in animal feed may create greater or even new health risks for animals.

### Risks arising from potential contaminants

The safety of residual streams used in animal feed is primarily determined by the presence or absence of physical or chemical residues, or biological infections. Table 1 provides an impression of a number of health risks that are now known.

### Risks arising from lower nutritional value

Some residual streams contain fewer nutrients than needed by animals. If animals are solely fed with residual streams, nutrient deficiencies may arise causing health problems (such as osteoporosis in the event of a shortage of phosphorus, or the animal may display harmful and aggressive behaviour in the event of a shortage of certain amino acids). A shortage of nutrients can be supplemented with food supplements, but the production level of the animal (and the breed) may also need to be adjusted in line with the quality of the available residual streams.

Table 1 Examples of health risks for animals posed by the use of current residual streams in animal feed, identified during the expert interviews.

Physical residues	<ul style="list-style-type: none"> <li>• Plastic from unpacked retail products</li> <li>• Soil</li> </ul>
Chemical residues	<ul style="list-style-type: none"> <li>• Mycotoxins in grain/maize/straw and in leftover pulp from oil crops</li> <li>• Heavy metals</li> </ul>
Biological residues	<ul style="list-style-type: none"> <li>• Foot-and-mouth disease, classical swine fever, BSE (from swill)</li> <li>• Listeria and Clostridium (from soil in feed)</li> </ul>

### ***Risks arising from different digestibility***

Health problems may occur if the digestibility of certain residual streams differs from what the animal is currently accustomed to. Feed that is too easily digestible may cause bowel disease. Feed that is difficult to eat may cause nutrient deficiencies.

### ***Risks arising from less consistent quality and availability***

The quantity and quality of the supply of residual streams is variable throughout the year. This makes it more difficult to provide animals with a consistent feed composition. In that case, we may need to select animals that are more resistant

to fluctuations in the supply and quality of feed. If we do not, health problems may arise.

### ***Opportunities for improved animal welfare***

Fortunately, the increasing use of residual streams in animal feed will not only result in risks. There are also opportunities to improve animal welfare. A cow that is only fed with grass and residual streams will probably produce less milk than at present. This may reduce the number of production-related reproduction problems and metabolic disorders, which is positive for animal welfare. Residual streams with a high fibre content have more volume and will be digested more slowly. The animal will spend more time eating and it will feel more satiated, which may reduce boredom and the risk of harmful behaviour.

The RDA has found that a complete overview of the effects of feeding residual streams to animals on their health and behaviour is currently not available.

## **Animal housing**

Circular agriculture focuses primarily on the preservation and management of natural resources and this provides scope for making choices in housing and farm management. The diversity in possible solutions is essential, and also provides scope for entrepreneurship. The guiding principle of the RDA is that animal welfare should be guaranteed in every housing system. The RDA has not only identified various potential risks in this area, but also opportunities for animals.



Photograph: Sabine Löwer

### **Potential risks**

In circular agriculture, the manure must be of the highest possible quality and it must be optimally used in the food production system. Nutrient losses represent additional leaks from the cycle. Optimising the use and quality of the manure will therefore have a high priority. Depending on the choices made, this may lead to a poorer stable climate or reduce the opportunity for outdoor access. In the area of housing, there are clear potential shifts between the environment and animal welfare. If the choice is made to house animals outside to a greater extent, other risks will arise, such as bird flu in poultry, tetanus/Weil's disease/skin burn in pigs and liver fluke in cattle grazing in wet pasture.

### **Potential opportunities**

Separating manure and urine at the source can significantly contribute to optimising the quality of manure. Separation strongly reduces ammonia emissions from stables and has a positive effect on the stable climate.

If the choice is made to house animals outside to a greater extent, this can contribute positively to animal welfare, because animals will be able to display their natural behaviour (such as grazing, rooting and roaming around) and they will experience the outside air as well as greater variation in their environment. For that matter, cows grazing on pastures can also contribute to landscape management and the preservation of biodiversity.

## **What animals are suitable for circular agriculture?**

Animals differ in terms of their ability to convert residual streams and grass into high-quality food, manure and other ecosystem services. That ability is influenced by factors including the animal species, breed and production level. Ruminants

occupy a unique role in circular agriculture because they convert grass into high-quality food for humans (milk and meat). Chickens can convert high-quality residual streams (such as bakery waste) into eggs and meat in a highly effective manner. Pigs can effectively manage liquid feed based on liquid residual streams. However, food waste streams are also extremely suitable for insect farming, and insects in turn can be used as food for humans and animals. Moreover, insects can live on residual streams that other farm animals are unable to utilise effectively, if at all.

The answer to the question of what combination of animal species can most effectively convert specific types of residual streams into high-quality food is not yet known. Questions that play a role in this include:

- What animal can convert residual streams and grass into high-quality food in the most efficient manner?
- What animal is best equipped to deal with animal feed of fluctuating quality and quantity?
- What animal/breed is the most suitable for housing systems with outdoor access?
- What breeds are the most suitable for a potentially lower production level?

## Safe and just operating space for sustainable food systems

Good animal welfare practices should be a guiding principle for any form of agriculture. Given that animal welfare is not automatically included in the cycle concept, it requires separate attention. People are treating animals with greater respect and do not want to see animals suffer (RDA, 2019). A new agricultural system should therefore imply an improvement in animal welfare. The RDA considers it the government's duty to clearly establish guiding principles for animal welfare and the duty of the RDA to provide advice. However, the government must provide clarity on all dimensions (ecological, economic and social) of food production in the Netherlands for the long term. This will offer farmers the opportunity to opt for a range of possible circular agriculture solutions and will foster entrepreneurship. This is illustrated in Figure 2 as *Safe and just operating space for sustainable food production*.

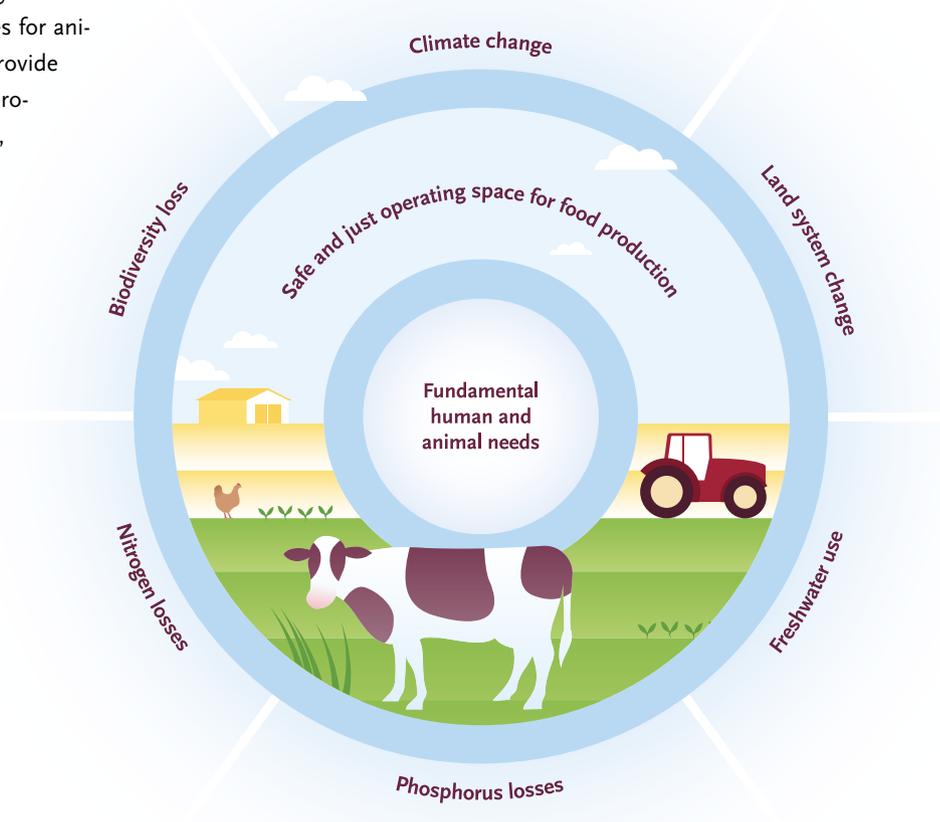


Figure 2 Determining safe and just operating space for sustainable food systems (De Boer et al., 2019). The operating space for agricultural entrepreneurs is determined by the ecological ceiling (such as nitrogen losses and loss of biodiversity), on the one hand, and by the social foundations, our social values (such as animal welfare and working conditions), on the other.

## Conclusions

The main conclusions of this advisory report are as follows:

- Improving animal welfare (*including health*) will not occur automatically in circular agriculture. In the RDA's opinion, circular agriculture that includes a role for animals will only be successful if good animal welfare practices are a requirement.
- Circular agriculture may have positive as well as negative implications for animal welfare. This applies to animal feed, housing and suitability of the animal in particular. Little is known to date about these specific implications.
- Circular agriculture calls for a redesign of our food system, in which all dimensions of sustainability (people, planet and profit) are already factored into its structure and the production aspects.

## Recommendations

Based on this advisory report, the RDA has formulated the following recommendations:

**1. Put animal welfare first in the transition to circular agriculture** and translate concepts of 'positive animal welfare' to livestock farming systems. Utilise the transition to move forward in building a humane livestock farming sector. The RDA believes it also has a role to play in this regard and will consider the nature of such a humane livestock farming sector and the pathway leading to it.

**2. The transition to circular agriculture represents a system change and requires time. The government, the business sector and NGOs should utilise that time to take a number of necessary steps to protect and improve animal welfare.**

- Invest in a research agenda and provide multi-year financing.
- Establish a Centre of Expertise for Animal Welfare (source of information, knowledge exchange) for entrepreneurs who want to embark on the transition to circular agriculture.
- Appoint an advisory committee (or assign that role to the RDA) to improve and protect animal welfare in circular agriculture, with participation of various stakeholder representatives (the business sector, NGOs and the government). The advisory committee can work on various tasks, including the following:
  - formulating innovation tasks and questions relating to animal welfare and circular agriculture for the Knowledge and Innovation Agenda of the Agri & Food Top Sector;
  - identifying the parameters for monitoring animal welfare;
  - advising on securing animal welfare, potentially institutionally.

**3. Strengthen the network and coordination in Europe in order to develop circular agriculture in a European context as well.**

A level playing field is required within Europe and this implies that European support must be sought. Utilise the European animal welfare bodies, where possible.

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Photograph: Henk Riswick

# Appendix

This advisory report is a product of the entire Council on Animal Affairs. It was prepared by a working group composed of RDA members Prof.dr.ir. I.J.M. de Boer (chair), Dr.ir. G.B.C. Backus, W.T.A.A.G.M. van den Bergh, Prof.dr.ir. J.W. Erisman, J.A.M. Huijbers and Prof.dr.ir. B. Kemp. The working group was

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