



**SCIENTIFIC COMMITTEE  
OF THE BELGIAN FEDERAL AGENCY FOR THE SAFETY  
OF THE FOOD CHAIN**

**ADVICE 09-2011**

**Subject: Development of an animal health barometer (Dossier Sci Com 2009/09 bis)**

Advice validated by the Scientific Committee on 26 September 2011

**Summary**

The aim of this advice is to present an instrument to measure the general health of the livestock population on a yearly basis in Belgium and to monitor its evolution over time. This instrument is, alongside the food safety barometer (Advice 28-2010) and the plant health barometer (Advice 10-2011), one of the 3 instruments to provide a bird's eye view on the overall status of the safety of the food chain in Belgium.

In order to measure the animal health situation, it is proposed to work with a set of indicators , the composition of which may change over time. Quantitative data must be available for these indicators in order to allow for a trend analysis over time. In total, 13 animal health indicators (AHI's) were identified and the results of 12 indicators (for one indicator the results were not yet available) were monitored between 2007 and 2010.

Compared to 2007 (the reference year) an improvement of overall animal health in Belgium was observed in 2008, 2009 and 2010, on the basis of these 12 indicators. The real significance of this positive evolution must however be assessed over the long term.

Lastly, a proposal for the visual presentation of the animal health barometer has been developed.

**Keywords**

Indicators - Barometer - Animal Health - Food chain

## 1. Terms of Reference

### 1.1. Question

This dossier was started following a request made by the Advisory Committee of the Federal Agency for the Safety of the Food Chain (FASFC or food agency) in regard to the identification of a number of indicators that can be used to measure the impact of the current FASFC food safety policy.

This dossier also links up with one of the objectives in the Business Plan drawn up by the Chief Executive Officer of the FASFC (Houins, 2009), in the sense that an instrument needs to be developed for the measurement and follow-up of the food safety evolution: a barometer for the safety of the food chain.

### 1.2. Scope

This dossier encompasses the **safety of the entire food chain** (from farm to fork). This means that both the safety of foodstuffs (food safety) and the animal and plant health status are taken into consideration.

The barometer of the safety of the food chain will thus be composed of three partial aspects: the "food safety" barometer, the "animal health" barometer and the "plant health" barometer.

In the meantime, the food safety barometer was introduced by the FASFC on 17 November 2010 during the International Symposium on '*Measuring Food Safety and comparing self checking systems*' based on advice 28-2010 of the Scientific Committee.

This dossier mainly focuses on the development of the concept with regard to measuring and monitoring the overall animal health situation (national).

A number of food crises that occurred in the 1990s (e.g. the BSE-crisis and the dioxin crisis) have shown that ensuring food safety can best be achieved by using a chain approach, whereby all respective stakeholders within the food chain bear their own responsibility for food safety as a whole. In Belgium, such an approach was first initiated by the FASFC, which was created in pursuance of the Law of 4 February 2000 (BS 18/02/2000). In creating a barometer of the safety of the food chain, it is clearly not the intention to develop an instrument for the assessment of the performance of the FASFC. This study aims to develop a method to measure animal health on a national level and on a yearly basis and must be situated within the scope of the expectations of society with regard to the competence of the FASFC for safeguarding the safety of food on the one hand, and animal and plant health, on the other.

### 1.3. Definitions

In this dossier, the following definitions are used:

- **Food chain:** any and all possible stages of the chain
  - o during the course of the breeding and keeping of animals and the growing of crops, starting from the biological material and all necessary raw materials or resources,
  - o during the course of the production of foodstuffs and animal feed, from the stage of raw material production up to the stage of consumption.

- **Safety of the food chain:** the general sanitary status of the food chain with regard to biological, chemical or physical hazards (including animal and plant/crop health), for which all respective segments within the food chain bear their own responsibility, ensuring that safe food is offered to the consumer (i.e. without the hazardous presence of biological, chemical or physical agents, and also taking into account the circumstances under which the product is normally being used by the consumer and the information that is available for the foodstuffs concerned).
- **Food safety:** the condition of the foodstuffs at all stages of production, processing and distribution, required to guarantee the protection of consumer health, and also taking into account normal circumstances of use and information available for the foodstuffs concerned.

Food safety thus means the absence of biological, chemical or physical agents (hazards) in the foodstuffs concerned (EC regulation n° 178/2002).

- **Food safety policy:** a set of dynamic initiatives (preventive and corrective) taken by the government over the entire food chain, with the intention of achieving a high-grade sanitary status for plants and animals and offering safe food to the consumer.
- **Indicator:** a measure for rendering and analysing certain problems or issues. An indicator synthesises or simplifies relevant data about the status or evolution of a number of phenomena or symptoms. An indicator represents a reality that is in itself not entirely perceptible. It is an indicator that is intended for communication and support in the decision-making process, and it can assume either a quantitative (cardinal) or a qualitative (nominal or ordinal) form. (In accordance with Indicators, goals and visions of sustainable development' - Federal Report on sustainable development, 2009).
- **Animal health:** general health situation of the productive livestock population.
- **Plant health:** overall phytosanitary situation of plants and plant products, i.e. the absence of regulated harmful organisms in accordance with the Law of 2 April 1971 on the control of organisms harmful to plants and plant products.
- **Animal Health Indicator (AHI):** an indicator that provides broad-scoped information about the overall animal health situation. The Animal Health Indicator is not a performance indicator, in the sense that it is not being used for evaluating the performance level of a certain (set of) activities, as is often done in a management context where the goals have been clearly set. The term Animal Health Indicator does not necessarily provide an assessment of the actual performance of any given activity.
- **Barometer for the safety of the food chain:** a visual rendering of the safety of the food chain, consisting of a food safety barometer, an animal health barometer and a plant health barometer.
- **Animal health barometer:** an instrument based on several Animal Health Indicators, used for providing a visually attractive representation of the animal health situation on a national level.
- **Key Activity:** an activity that forms part of the food chain and represents a considerable production volume, and/or may have a considerable impact on the food chain safety and indirectly on animal health because of the very nature of the activity.

**After due deliberation** of the work group meetings on 23 March 2010, 26 April 2010, 29 June 2010, 23 September 2010 and 15 March 2011 and the plenary sessions that took place on 18 June 2010, 15 October 2010, 19 November 2010, 27 May 2011 and 16 September 2011,

**the Scientific Committee recommends as follows:**

## **2. Introduction**

The idea of a barometer to measure the safety of the food chain must be viewed within the context of the prevailing trend towards measurable objectives, indicators, assessments, score systems and the like. This idea is also being inspired by the introduction of similar notions in other sectors, such as the inter-federal poverty barometer<sup>1</sup> and the sustainability barometer (Sustainable Development Task Force, 2009).

The barometer of the status and the safety of the food chain consists of several parts, namely:

- a food safety barometer (safety status of foodstuffs);
- an animal health barometer;
- a plant health barometer.

These barometers are not aimed at providing an exact and complete image of all possible hazards and risks within the food chain. They rather serve as an instrument for communication and trend analysis with regard to the safety status of the food chain, intended towards a broader public and/or to the respective stakeholders in the food chain. Therefore, its intention does not involve drawing up a comprehensive scientific report giving an exact image of the presence and status of all potential dangers within the food chain, nor is it intended to carry out any form of risk assessment.

The barometers must be seen as a practical instrument giving a mere **indication** of the safety status within the food chain (on food safety, animal health and plant health levels), as based on measurements obtained through a limited number of carefully selected indicators which relate to the respective hazards and partial aspects of the food chain, and which, as a whole, will provide a representative image of the actual situation. The selection of the indicators, as well as a number of related assumptions for this animal health barometer are further discussed below.

## **3. Work method**

### **3.1. Development of a research method**

In order to be able to identify which indicators are suited to determining animal health in a well-substantiated way, a research method was developed, consisting of several steps.

#### *3.1.1. Step 1: Defining the research area*

Despite the fact that the notions of "food safety", "animal health" and "plant health" are well integrated in our society, it is apparent that accurate definitions for these notions are lacking, both in the broad literature as in national and European legal reference documents. The

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<sup>1</sup> ([http://enquete.mi-is.be/armoedebarmeter/pages\\_nl/startMenu.html](http://enquete.mi-is.be/armoedebarmeter/pages_nl/startMenu.html))

drawing up of accurate definitions and interpretations of the scope has thus constituted an important step in this process (see above).

### 3.1.2. Step 2: Identification of the policy objectives with regard to animal health

It has been found that the policy objectives regarding animal health are not quantitatively described either in national or European documents. On a European level, in 2007 the European Commission presented a new comprehensive strategy aimed at improving animal health, on the pretext of "prevention is better than cure". Four overall objectives were put forward (European Commission, 2007):

- to ensure a high level of public health and food safety by minimising the incidence of biological and chemical risks to humans
- to promote animal health by preventing/reducing the incidence of animal diseases, and in this way to support farming and the rural economy
- to improve economic growth/cohesion/competitiveness assuring free circulation of goods and proportionate animal movements
- to promote farming practices and animal welfare which prevent animal health related threats and minimise environmental impacts in support of the EU Sustainable Development Strategy

In 2009, Humblet et al. proposed the adoption of Millennium Development Goals for animal health, and more specifically for bovine tuberculosis, much like the goals implemented by the United Nations in 2000 for AIDS, malaria and other human diseases ([www.who.int/mdg/eng](http://www.who.int/mdg/eng)). The Millennium Development goals must be regarded as a major challenge for the future of animal health as they allow for quantitative policy goals to be defined (Saegerman et al., 2011).

At the time the FASFC was created, the expectations regarding the organisation of the food chain control system were clearly defined (Law of 4 February 2000). This control system was meant to cover the entire food chain, from the point of view of protecting public health, as well as implementing basic principles, such as transparency, co-operation, consultation, scientific support, self-checking, pro-activity and responsiveness, implementation of risk analysis and of the precautionary principle, as well as the quality, integrity and independence of services offered.

As far as the set goals for plant health, animal health and food safety are concerned, much has yet to be clarified: the descriptions or specifications don't go any further than a mere "guarantee for a permanent high quality of our food" and "the high and continuous protection of plant and animal health".

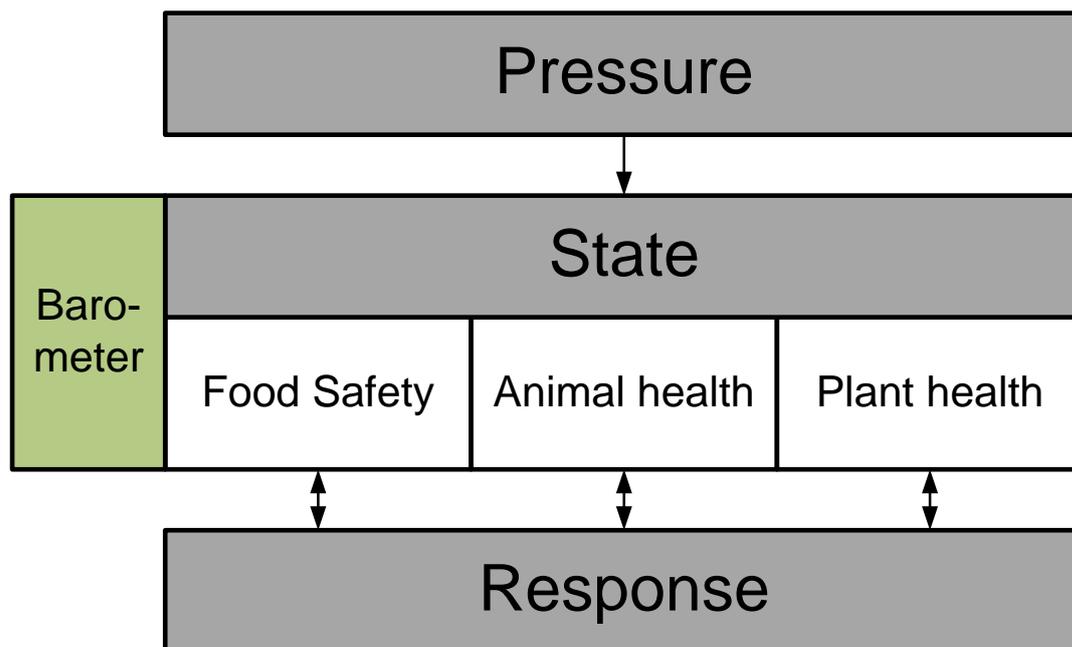
### 3.1.3. Step 3: The selection of a scientifically substantiated concept: the "Pressure-State-Response" concept and its implementation on the food chain

The development of the food chain safety barometer was based on the Pressure-State-Response' (PSR) concept, which serves as a starting point for establishing the research model. The PSR concept was used in the 1980s by the OECD for the classification of environmental indicators into three different categories: pressure (P), status (S), and response (R) (OECD framework for environmental indicators; Van Gerven et al., 2007). The PSR concept is based on the principle of causal relationship, occurring when human activities exert a pressure on the system, thereby causing a change in the status (or 'state') of said system. Society must react to these changes and will ultimately have to take decisions ('response').

The Pressure-State-Response' concept is described in further detail in advice 28-2010. It will not be discussed in detail in this advice. It should however be recognised that this concept also applies to the determination of animal health and the understanding of its developments.

## **3.2. Developing a measurement system for Pressure-State-Response**

A measuring system is needed for determining the Pressure, the Status (or 'State') and the Response. As the 3 components of the PSR-model each stand for a different aspect of the safety of the food chain, it is not possible to develop one single measuring system for all three components. As a consequence, specific measuring systems were established for pressure, status and response. It was decided that **the final barometer should only consist of 'Status' and that 'Pressure' and 'Response' would be used to give a further interpretation to 'Status' within a broader social and policy-related context.** The final barometer consists of 3 partial aspects, namely food safety, animal health and plant health, and will be measured using a range of indicators. The 'Pressure' and 'Response' will be charted by means of an inquiry among stakeholders. Figure 1 illustrates the implementation of the PSR-model on the safety of the food chain.



**Figure 1: Implementation of the Pressure-State-Response model on food chain safety**

### 3.2.1. 'Pressure' Measurement

See advice 28-2010.

### 3.2.2. 'Status' Measurement

As explained before, food chain safety can be split up into 3 partial aspects, namely food safety, animal health and plant health. As the specific status of each of these three partial aspects may be of a very divergent nature, and in view of their importance to the respective stakeholders, a decision was taken to measure each of these 3 partial aspects separately.

Numerous controls and inspections are being conducted by the FASFC, in order to monitor animal health. If all the results of these controls and inspections were to be incorporated into this measuring instrument, this would only lead to an unworkable instrument, and would pass beyond the objectives of using 'indicators'. Furthermore, an overview of most of these measurement data is publicly available in the annual reports of the FASFC or other authorities, institutions or organisations.

In pursuance of the health index<sup>2</sup>, 3 sets of indicators representative of the state of food safety, animal health and plant health were selected. An indicator provides information about a partial aspect of the status. The indicators are basically descriptive in nature, and are not intended for checking any data against any set goals. Their real goal is to achieve a trend analysis of the overall situation over the longer term, both in terms of the individual indicators and in terms of the barometer itself (across all indicators).

The exact composition of the battery of indicators is therefore of major importance. Hence it is also clear that this battery of indicators cannot encompass all aspects of animal health on its own. It is self-evident that each indicator will have its own limitations. The composition of this battery of indicators may be modified from time to time, whenever it is apparent that some indicators are no longer representative, or whenever other indicators appear to better reflect the actual situation as a result of new developments.

The concept of using a battery of indicators inherently implies that choices must be made as to the definitions of these indicators. A number of criteria have been established for the selection of carefully considered indicators:

- **Measurability:** The actual goal of status measurement is to find out whether overall food safety, animal health or plant health have improved, deteriorated or remained the same. That is why indicators were selected that are measurable on a quantitative data basis and that are also capable of rendering evolutionary trends over certain periods of time.
- **Independence:** It is recommended that the indicators should not overlap each other.
- **Reliability:** The indicators must not be sensitive to any bias (deviations).
- **Availability:** The information required for the indicator must at all times be easily available in existing reports, documents or databases. Only results that were collected in the context of the control programme will be used for product control purposes.
- **Representative for food safety, animal health or plant health.**
- **Representative for the food chain:** The set of indicators must be representative for the entire chain giving specific attention to the various sectors for which international trade and intracommunity trade must be taken into account.
- **Unambiguity of the wording:** There must be an unambiguous relationship between a modification of the indicator and the modification of food safety, animal health and plant health.
- **Sustainability:** The indicators have been measured in a similar manner over several years already, and it is expected that they will be further followed up during many years to come.

#### **Case study: Animal health barometer**

Based on the above-mentioned criteria, a set of 13 different indicators has been composed (table 1). A specific characteristic of the animal health barometer (compared with the food safety barometer and the plant health barometer) is that some of the data originated from sources external to the FASFC. This is the particular case for indicator AHI 7, the data for which originate from the Walloon Milk Committee and the Flanders Milk Control Centre as well as indicators AHI 10 and 11 for which mortality data were obtained from Rendac.

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<sup>2</sup>[http://economie.fgov.be/nl/statistieken/cijfers/economie/consumptieprijsen/gezondheidsindex/wat\\_is\\_gezondheidsindex/](http://economie.fgov.be/nl/statistieken/cijfers/economie/consumptieprijsen/gezondheidsindex/wat_is_gezondheidsindex/)

This set of indicators includes:

- primary animal production, namely: producers, traders, collection centres, transportation, artificial insemination centres, embryo collection teams, slaughterhouses and fish markets;
- the various species: cattle and calves, pigs, small ruminants, solidungulates, poultry and ratites, cervids, bees, rabbits, farmed game, fish, molluscs and shellfish;
- process control (inspections/audits)
- a preventive approach (self-checking/mandatory notification/traceability);

Table 1 provides an overview of the 13 animal health indicators. For each indicator, a detailed technical data sheet was drawn up, which can be found in Appendix 1.

**Table 1: Overview of the animal health indicators**

Title	Description
AHI 1: The duty to mandatory report notifiable animal diseases	The percentage of mandatory notifiable animal diseases that the FASFC has reported in relation to the total number of mandatory notifiable animal diseases.
AHI2: Self-checking for the primary animal production sector	The percentage of performed key activities using a validated/certified self-checking system in the primary animal production sector, on an annual basis.
AHI3: Inspections of infrastructure, facilities and hygiene	The percentage of annual inspections with regard to infrastructure, facilities and hygiene that were deemed to be favourable or favourable with remarks.
AHI4: Traceability inspections	The percentage of annual inspections relating to traceability that were deemed to be favourable or favourable with remarks.
AHI5: Animal welfare inspections	The percentage of annual inspections relating to animal welfare that were deemed to be favourable or favourable with remarks.
AHI6: The duty to report bovine abortions	The percentage of bovine abortions tested annually in relation to the total number of female bovine animals aged over 24 months.
AHI7: Number of somatic cells in milk	The percentage of tank milk samples for which the number of cells is below or equal to 400.000/ml annually
AHI8: Parasitic liver damage in pigs	The percentage of healthy pig livers (not condemned) annually in relation to the number of slaughter pigs slaughtered in Belgium.
AHI9: Antibiotic resistance in <i>E. coli</i> indicator bacteria	The annual percentage of <i>E. coli</i> isolates from live animal sources, collected by the FASFC within the framework of indicator bacteria monitoring and sensitive to all of the antibiotics tested.
AHI10: Mortality in slaughter pigs	The annual percentage of slaughter pigs that have died and been disposed of at a destruction plant (Rendac).
AHI11: Mortality of small ruminants	The annual percentage of small ruminants (sheep and goats) that have died and been disposed of at a destruction plant (Rendac).
AHI12: Poultry carcasses declared non-compliant	The annual percentage of poultry carcasses declared non-compliant during the slaughter process
AHI13: Mortality of veal calves	The percentage of veal calves slaughtered in relation to the number of all calves reared at the veal calf holdings.

For the purpose of verifying whether or not the whole set of indicators is representative for the entire animal production chain, an Animal Health Indicator Matrix has been established (table 2). This matrix shows the relationship of the different Animal Health Indicators with the respective segments of the animal production chain.

**Table 2: Overview of the number of Animal Health Indicators that are related to the different segments of the animal production chain.**

Food chain segment	Number of Animal Health Indicators	AHI
Suppliers	3	AHI 2, 3 to 4
Primary animal production	11	AHI1, 2, 3, 4, 5, 6, 7, 9, 10, 11 to 13
Processing	6	AHI3, 4, 5, 7, 8 to 12
Distribution	2	AHI3 to 4
Imports	1	AHI1

Appendix 2 provides an overview of the various species to which each animal health indicator relates, through which an overview of the representativeness of the indicators for the entire animal production chain can be obtained.

The indicators measure and reflect the different aspects of the general health situation of the animal population and are based on preventive measures, control actions and on animal health. These preventive measures for safeguarding animal health include the setting up and implementation of animal health management systems (namely self-checking, based on good working practices and mandatory notification). The control actions involve infrastructure control, traceability, disease notification, the quality control of products (analyses) or bodies, hygiene and mortality.

Each indicator has its own strengths and weaknesses, as explained in the technical data sheets in Appendix 1. In this respect, it is important to take into account the context within which the indicators were defined. The identified "animal health indicators" must constitute the basis of a health barometer. The goal is to introduce a systematic operating procedure based on this "barometer" in order to enable the monitoring of the animal health situation, in a way that is accessible to a broader public.

In this context, certain indicators or indicator groups should be interpreted as follows:

For example, as regards the reporting of mandatory notifiable animal diseases (AHI1), it is clear that an increase in the number of reports may possibly be due to the introduction of infectious diseases or may be the result of a higher degree of alertness (whether or not stimulated by media campaigns), leading to a greater degree of vigilance. Given that mandatory notification is an inherent part of the preventative approach, and is also essential for preventing the spread of animal diseases, an increase of the number of reported cases should therefore be considered in this context as an indication of a substantial degree of vigilance with regard to the safeguarding of animal health.

As for the presence of a validated/certified self-checking system (AHI2), it should be noted that the operators may freely choose whether or not they want to have their self-checking system validated/certified. Attention should however be drawn here to the fact that where there is no validated/certified self-checking system for a key activity, it does not mean that the self-checking system is absent or malfunctioning. The point is that an independently validated/certified self-checking system provides added value and adds to the confidence as to the foundations and functioning of such system. An increase of the percentage of key activities with a validated/certified self-checking system thus indirectly leads to a higher confidence level with regard to adequate preventive actions taken in order to ensure overall animal health.

As regards the results of the inspections (AHI3, AHI4, AHI5), any changes that may be made to the evaluation system from time to time (e.g. new checklists, different action limits or tolerance levels) must be taken into account. This may result in year-to-year differences with

regard to the detection of non-conformities. It is however recommended that, in the event of significant changes to the evaluation system, both the sector and the authorities make great efforts in raising awareness, informing and assisting the concerned operators, with a view to applying and limiting the non-conformities to a new evaluation system. This is why, for some indicators, one must also take into account the fact that some inspections may have been aimed at high-risk production sites, products or countries of origin as a result of which some degree of bias may be involved. This is however a systematic bias that is inherent to the development of a risk-based control program.

Indicators AHI6 to AHI13 relate to certain observations in the animal population, on the animal products and on carcasses, and concern animal health both directly and indirectly. Indicator AHI6 relates to, as is the case with indicator AHI1, the monitoring of animal production health. For example, an increase in the number of bovine abortions (AHI6) must be considered first and foremost as an indication of improved animal health monitoring. It is clear that the changes to the animal health monitoring programme and the awareness raising of the sectors concerned has an influence on this indicator. The introduction of the abortion monitoring protocol since the end of 2009 is a good example of this.

Indicators AHI10, AHI11 and AHI13 relate to the mortality within a population and are general indicators, but they are nevertheless informative indicators as regards the health of the productive livestock population.

## **Results and presentation**

As indicated in the technical data sheets (appendix 1), data were gathered for the Animal Health Indicators for the years 2007, 2008, 2009 and 2010. Table 3 gives an overview of the Animal Health Indicators for which data was available.

**Table 3: Overview of the results for 2007, 2008, 2009 and 2010 of the respective Animal Health Indicators and the calculation of the statistical difference (\* = p < 0,05, \*\* = p < 0,01, \*\*\* = p < 0,001) between two consecutive years.**

	Results for 2007	Results for 2008	Results for 2009	Results for 2010	% Change (2008/2007) <sup>1</sup>	Significance level	% Change (2008/2007) <sup>2</sup>	Significance level	% Change (2008/2007) <sup>3</sup>	Significance level
AHI1	16,44%	10,96%	13,70%	9,59%	-33,33%		25,00%		-30,00%	
AHI2	0,17%	0,84%	6,19%	15,09%	394,12% <sup>6</sup>	***	636,90% <sup>6</sup>	***	143,78%	***
AHI3	98,20%	98,47%	98,63%	98,12%	0,27%		0,16%		-0,52%	
AHI4:	94,36%	94,85%	95,39%	94,90%	0,52%		0,57%		-0,51%	
AHI5	98,30%	98,14%	97,10%	97,16%	-0,16%		-1,06%	***	0,06%	
AHI6	0,27%	0,29%	0,24%	0,46%	7,41% <sup>7</sup>	**	-17,24% <sup>7</sup>	***	91,67% <sup>7</sup>	***
AHI7	89,14%	89,16%	88,74%	88,77%	0,02%		-0,47%	***	0,03%	
AHI8	99,20%	98,94%	98,44%	96,78%	-0,26%	***	-0,51%	***	-1,69%	***
AHI9	/	/	/	/	/ <sup>5</sup>		/ <sup>5</sup>		/ <sup>5</sup>	
AHI10	5,03%	4,07%	3,58%	3,40%	19,09% <sup>4</sup>	***	12,04% <sup>4</sup>	***	5,03% <sup>4</sup>	***
AHI11	21,54%	12,82%	11,33%	11,27%	40,48% <sup>4</sup>	***	11,62% <sup>4</sup>	***	0,53% <sup>4</sup>	
AHI12	0,79%	0,6%	0,81%	0,82%	3,80% <sup>4</sup>	***	-6,58% <sup>4</sup>	***	-1,23% <sup>4</sup>	***
AHI13	5,19%	5,23%	4,19%	5,19%	-0,77% <sup>4</sup>		19,89% <sup>4</sup>	***	-23,87% <sup>4</sup>	***
<b>Globally</b>					<b>3,37%<sup>8</sup></b>		<b>3,95%<sup>8</sup></b>		<b>15,27%<sup>9</sup></b>	

<sup>1</sup> % Change = (2008 result – 2007 result)/2007 result x 100%.

<sup>2</sup> % Change = (2009 result – 2008 result)/2008 result x 100%.

<sup>3</sup> % Change = (2010 result – 2009 result)/2009 result x 100%.

<sup>4</sup> The sign of this indicator was changed since a decrease of this indicator actually shows an improvement in animal health.

<sup>5</sup> Result not available yet.

<sup>6</sup> Given that the percentage of the key activities with a validated self-checking system was below 1% in 2007 and 2008, the impact on animal health is only very limited. This indicator is neutralised in the barometer for 2008/2007 and 2009/2008.

<sup>7</sup> Although the prevalence of this indicator is below 1%, it is taken into account as the percentage of bovine animals that abort is low.

<sup>8</sup> Average value of the 11 indicators (excluding AHI2 and AHI9; see <sup>5</sup> and <sup>7</sup>)

<sup>9</sup> Average value of the 12 indicators (excluding AHI9, see <sup>5</sup>)

Certain AHIs (AHI3, AHI4 and AHI5) are expressed as a percentage of inspections that were given a 'favourable' opinion or 'favourable with remarks'. These indicators show the extent to which the operators or products have met the legal requirements.

Using a Poisson regression, it was checked whether the observed changes (comparison of 2008 versus 2007, comparison of 2009 versus 2008, comparison of 2010 versus 2009) were to be considered as statistically significant. It should be noted that for certain indicators (e.g. AHI7, AHI8, AHI12) the determination of the statistical significance is based on a large number of observations through which small variations in a particular indicator may give rise to significant differences that may not necessarily be of biological significance.

This analysis has demonstrated that overall animal health has improved between 2007 and 2010.

**Table 4: Overview of the indicators that have shown the greatest and most significant variations during the 2007-2010 period.**

2008/2007	2009/2008	2010/2009
AHI10 (+19,09%)	AHI10 (+12,04%)	AHI2 (+143,78%)
AHI11 (+40,48%)	AHI11 (+11,61%)	AHI6 (+91,67%)
	AHI13 (+19,89%)	
	AHI6 (-17,24%)	AHI13 (-23,87%)

Between 2007 and 2010, there has been a continuous decrease in pig mortality (AHI10), which was most notable between 2007 and 2008 and between 2008 and 2009. The mortality of small ruminants (AHI11) has also decreased substantially, particularly between 2007 and 2008 as well as between 2008 and 2009, mainly as a result of the favourable developments following the bluetongue disease epidemic of sheep in 2007. However, it appears that the mortality rate in small ruminants is relatively high in relation to other animal species.

Between 2009 and 2010, there was a substantial increase in the percentage of abortions (AHI6) following the introduction of the 'abortion protocol'.

For AHI13, there was a significant increase in the mortality of veal calves between 2009 and 2010, while mortality declined significantly between 2008 and 2009.

As for the proposed processing of results, **no weighting of indicators has been included**, as a result of which each indicator will have a similar impact on the barometer. As previously mentioned, when viewed from society's standpoint, the definition of the concept of 'Animal Health' is not as unambiguous as it seems: the impact of the various indicators on animal health may be perceived in a different way by different individuals or stakeholders. It is possible that one and the same change, when applied to several indicators, may result in different impacts on animal health. For example, the impact on animal health of a 20% increase of AHI1 (mandatory notifiable animal diseases) could be greater than a 20% decrease of AHI8 (Parastic liver damage in pigs). As previously mentioned, the primary goal of the barometer is to conduct a measurement and trend analysis of the 'Animal health' situation on the basis of indicators that are directly or indirectly related to the monitoring and ensuring of animal health throughout the entire animal production chain, rather than conducting a comprehensive animal health measurement. In order to get a proper insight into the degree of importance attached to certain indicators by the various stakeholders and experts, a weighting of the indicators has been proposed using the Las Vegas method (Gore, 1987) with the purpose of determining the relative importance of the indicators as a measure of animal health.

Figure 2: Visual representation of the 2007-2008 animal health barometer (scale -40% up to +50%)

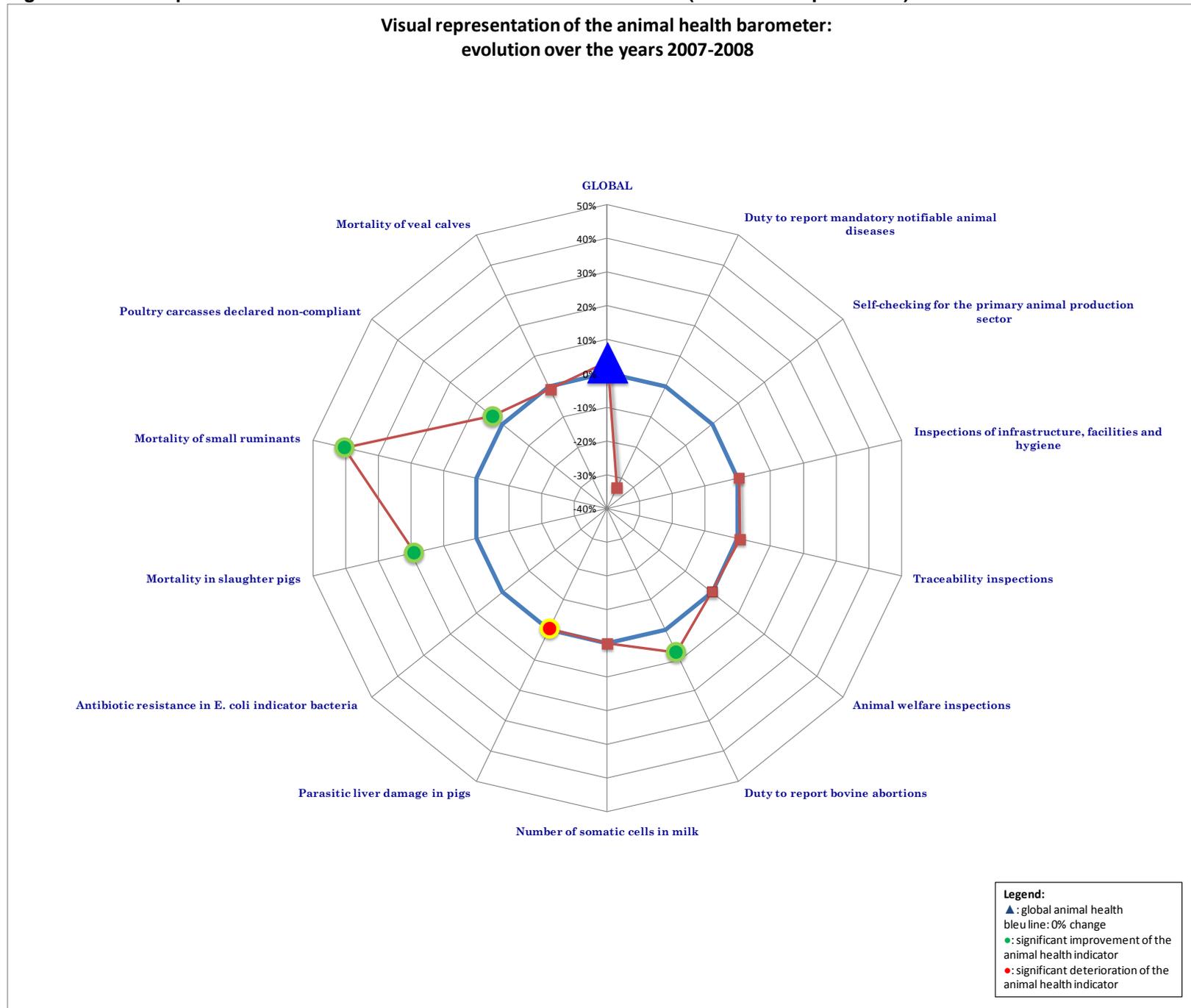


Figure 3: Visual representation of the 2008-2009 animal health barometer (scale -20% up to +25%)

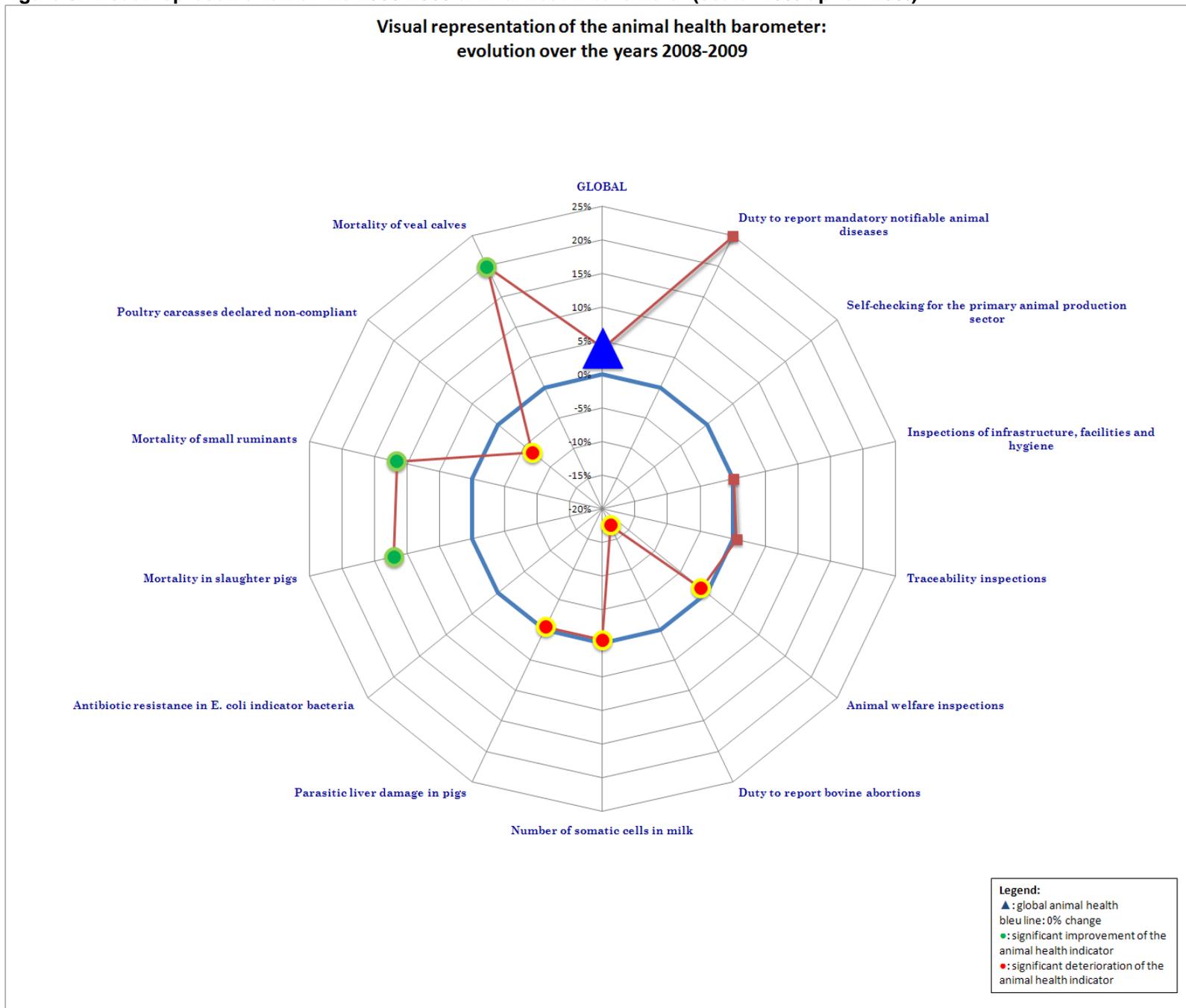
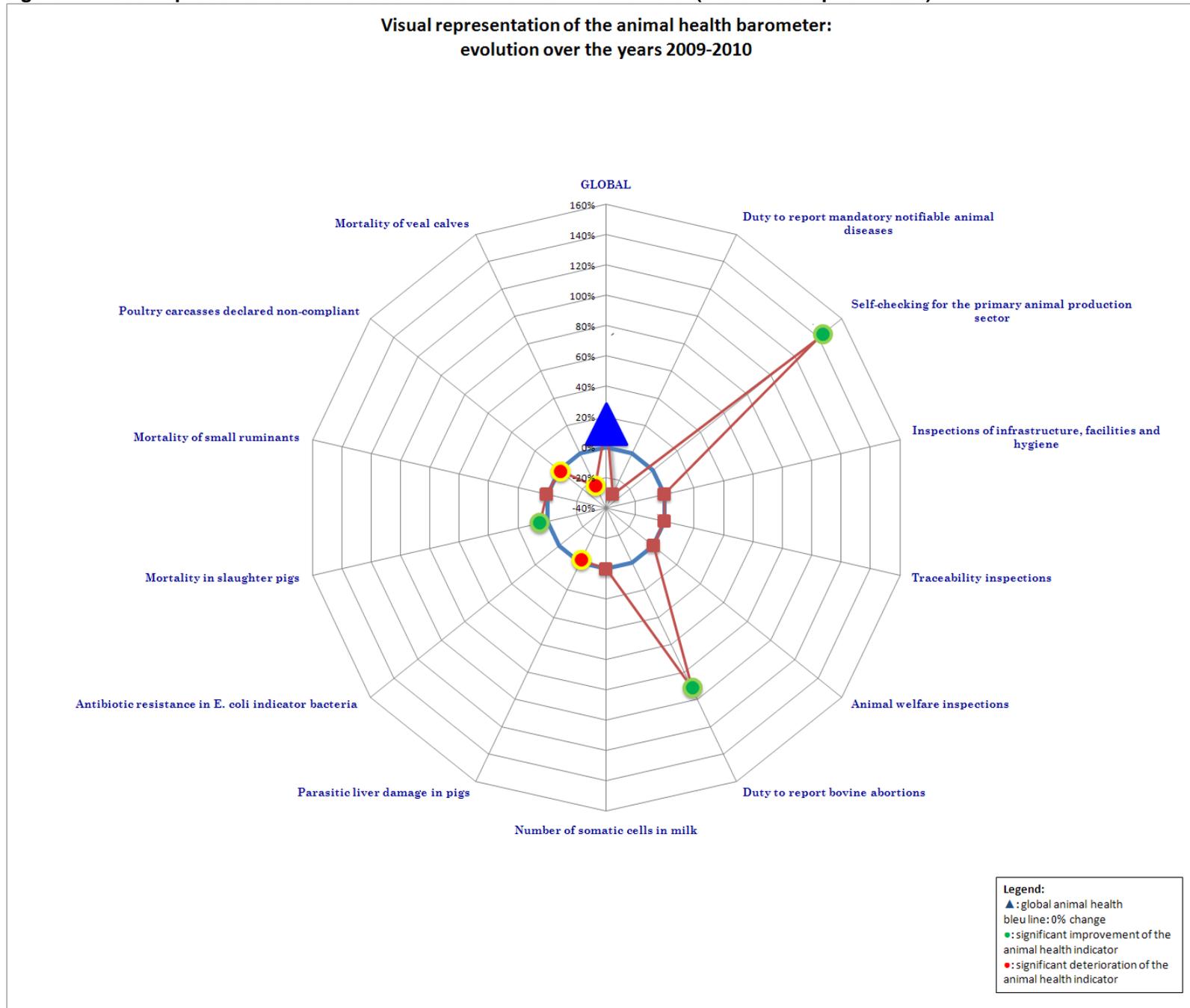


Figure 4: Visual representation of the 2009-2010 animal health barometer (scale -40% up to +100%)



### 3.2.3. 'Response' Measurement

See advice 28-2010.

## 4. Conclusion

The aim of this dossier is to present an instrument to measure the general animal health situation on a yearly basis in Belgium and to monitor its evolution over time. This instrument is, alongside the food safety barometer (Advice 28-2010) and the plant health barometer (Advice 10-2011), one of the 3 instruments to provide a bird's eye view on the overall status of the safety of the food chain in Belgium.

The Pressure-State-Response (PSR) model was used as a basis, where the status (or State') represents the actual barometer. 'Pressure' and 'Response' must be considered as additional information for interpreting and explaining the actual barometer.

In order to measure the animal health situation, it is proposed to work with a set of indicators, the composition of which may change over time. In total, 13 animal health indicators (AHI's) were identified and the results of 12 indicators (for one indicator the results were not yet available) were monitored between 2007 and 2010.

Based on these 12 animal health indicators,, it has been found that animal health in Belgium has shown a positive evolution, the real meaning of which must be assessed over the long term.

The Scientific Committee is aware that each indicator has its respective strengths and weaknesses and that the whole set of indicators is representative for animal health in Belgium and incorporates various aspects of the food chain, but does not encompass each and every aspect of animal health.

Nevertheless, the task of developing a representative range of indicators for evaluating animal health has not been easy. To remedy this, the Scientific Committee recommends to conduct a weighting of the indicators, by the various food chain stakeholders and experts. In addition, from time to time it will be necessary to assess the battery of indicators in order to decide whether new indicators need to be included or whether existing indicators need to be withdrawn.

The Scientific Committee came to the conclusion that the policy goals regarding animal health were not quantitatively defined, neither in national documents, nor in European documents. If more measurable goals were to be made available for specific points of interest, a further objective assessment with regard to the improvement of animal health would be simplified.

On behalf of the Scientific Committee,  
The President

Prof. Dr. Ir. Andre Huyghebaert

Brussels, 07/10/2011

## Appendices

- Appendix 1: Technical data sheets of the animal health indicators**
- Appendix 2: Animal species to which the animal health indicators apply**
- Appendix 3: Overview of key activities**

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## Incompatibilities

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## Legal framework of this advice

The Law of 4 February 2000, on the establishment of the Federal Agency for the Safety of the Food Chain, and in particular article 8 of said Law;

The Royal Decree of 19 May 2000, on the structure and operating procedures of the Scientific Committee, as established within the Federal Agency for the Safety of the Food Chain;

The Internal Rules as mentioned in Article 3 of the Royal Decree of 19 May 2000, on the composition and operating procedures of the Scientific Committee established within the Federal Agency for the Safety of the Food Chain, as approved by the Minister on 9 June 2011.

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