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Subject:

Revision of the animal health barometer

(SciCom 2014/12B)

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Executive summary

Background & Terms of reference

The animal health barometer was developed in 2011 as a tool to present to both consumers and the food chain sectors a clear picture of the state and evolution of the animal health in Belgium. The barometer (barometer version 1.0) is based on a basket of 13 animal health indicators (FSIs) for which data were gathered from 2007 on. Following a SWOT analysis (identification of strengths, weaknesses, opportunities & threats) of the barometer in 2013 indicating a number of issues for improvement, the Scientific Committee is asked to reevaluate the concept of the barometer on a scientific basis. More specifically, following questions are raised:

- (i) Are the current indicators still relevant?
- (ii) How to deal with the indicators whose interpretation is open to debate?
- (iii) Should new indicators be included?
- (iv) Is a new weighing of the indicators required?
- (v) Should the current scale definition be maintained?
- (vi) Is a trend analysis based on the barometer results possible?

Methodology

The basket of animal health indicators on which the barometer is based, as well as the approach followed for 'measuring' the animal health state are revised based on information available from scientific literature and reports, on expert opinion and on data available from the Belgian Federal Agency for the Safety of the Food Chain (FASFC).

Discussion

Based on a number of criteria, such as current relevancy and consistency between changes observed in terms of data and in terms of (biological) evolution, the basket of 13 AHIs was re-examined. This resulted in a new basket of 15 AHIs, including some of the original AHIs but also a number of newly defined AHIs. Similarly to the previous indicator basket, the new basket that is proposed, contains AHIs related to the preventive approach (self-checking, notifications, inspections), to the control of animal products, and to animal health (mortality figures and antimicrobial consumption). In compiling the basket it was aimed to include as representatively as possible the various aspects of the animal production chain.

An overview of the indicators kept, changed, or newly defined together with a short argumentation is given attached to the opinion. For each of the 15 AHIs selected, more detailed information is given in technical sheets, available in appendix as well.

Two approaches are proposed for representing the food safety status;

The first approach, barometer version 2.1, is similar to the approach applied for the original version of the barometer (version 1.0). The animal health state is expressed in terms of percentage as the average of the differences between the results of the AHIs for two successive years. In the opinion, the animal health state of 2012, 2013, 2014 and 2015 is calculated accordingly, based on the new basket of 23 AHIs.

The second approach, barometer version 2.2, concerns a measurement of the state against predefined objectives. The animal health state is expressed in terms of percentage as the average of the difference

between the results of the AHIs and the objective targeted for each AHI. Given that for some AHIs there is still a large margin of improvement, whereas for others reported results are already (relatively) close to the predefined objective, the AHI objectives are expressed as a (theoretical) improvement potential (IP). This IP, being the difference between the objective and the median AHI result over a given time frame, is introduced to scale the divergent margins of improvement for the different AHIs. The time frame considered for determining the median AHI result, can be a fixed period in time (static) or a moving X-years window (dynamic). A moving X-years window allows more flexibility in the tool (amongst others, the evolution of the indicator results is accounted for and objectives can be linked to e.g. the 'Multi Annual National Control Plan' or MANCP cycle). However, for the purpose of evaluating the evolution of the indicators towards their predefined objective, the considered X-year timeframe should be sufficiently long and the predefined objectives should be fixed over a sufficiently long period of time as well.

Answer to the questions

(i) Are the current indicators still relevant?

(ii) How to deal with the indicators whose interpretation is open to debate?

(iii) Should new indicators be included?

Some of the barometer version 1.0 indicators are kept unchanged (e.g. the AHIs related to control of processes and animal products), while others are reformulated (e.g. AHI1 – notification of mandatory notifiable animal diseases). AHI5 (Animal welfare inspections) had to be removed from the basket of indicators from 2015 on. Although this indicator is still relevant, it cannot be calculated anymore because the inspection of animal welfare has recently become a part of the competences of the regions and the former scoring system of the FASFC is no longer applied. Furthermore, 2 new AHIs (AHI14 – relative number of outbreaks of notifiable animal diseases and AHI15 – antimicrobial consumption in animal production) are added to the basket.

A new indicator basket containing 15 AHIs is thus composed. These AHIs are discussed with respect to their relevance, acceptability, credibility, easiness to monitor and robustness (RACER criteria).

(iv) Is a new weighing of the indicators required?

A new weighing of the AHIs is not a prerequisite, but is recommended. Moreover, inclusion of such an assessment of the relative importance of the AHIs on animal health was identified as one of the strengths in the SWOT.

(v) Should the current scale definition (barometer version 1.0) be maintained?

The difficulty remains that animal health cannot be expressed in absolute values. Given the straightforward approach of barometer version 1.0, it was chosen to maintain the current scale definition. Besides the scale definition of barometer version 1.0 applied to the new set of AHIs (i.e. barometer version 2.1), an alternative scale definition based on a measurement against predefined objectives (i.e. barometer version 2.2) is nonetheless proposed. The two scales can be used complementary.

(vi) Is a trend analysis based on the barometer results possible?

A trend 'analysis', or rather a trend 'observation' is possible and comes down to what can be visually observed from the barometer results. Whereas the final barometer result is used as a first line of communication, the actual evaluation of the animal health state is based on the individual indicator results. Given that the set of AHIs does not include all of the potential risks or hazards that might occur, it is possible that specific incidents are not picked up by the barometer. The primary goal of the barometer is to conduct a measuring of animal health status and evolution, on the basis of indicators that are directly or indirectly related to monitoring and ensuring animal health throughout the entire

animal production chain, and not to conduct a comprehensive “all-in” risk evaluation of animal health or to measure the animal health status.

Conclusions

The animal health barometer (version 1.0) was revised resulting in a new basket of 15 animal health indicators. Based on this new basket, two approaches are proposed and illustrated for presenting the animal health status, namely (i) as a measurement in terms of a relative change of the status between two successive years (i.e. version 2.1, with a similar approach as used in version 1.0), and (ii) as a measurement against predefined objectives (i.e. version 2.2). In this sense, both approaches complement each other since the first approach or barometer version 2.1 is rather a communication tool, whereas the second approach or barometer version 2.2 is a more policy-oriented instrument. The current opinion concerns the evaluation of the concept of the animal health barometer on a scientific basis. Although the Scientific Committee proposed a methodology of approach, it is up to the risk management to turn the concept into reality, amongst others with respect to the predefined objectives, the chosen window of comparison, etc. Additional refinement of the barometer versions might consist of a weighting of the indicators in function of their direct relationship to animal health as perceived by various stakeholders of the animal production chain.

1. Terms of reference

1.1. Questions

The barometers for the safety of the food chain (food safety barometer, animal health barometer and plant health barometer) have been in use since 2010. They made it possible to get an overall view of the evolution of the safety of the food chain since 2007 (<http://www.favv.be/scientificcommittee/barometer/>). Given that the barometers already cover a period of many years, the Scientific Committee is asked to evaluate the concept of the barometers on a scientific basis.

Following specific questions are raised:

- (i) Are the current indicators still relevant?
- (ii) How to deal with the indicators whose interpretation is open to debate (e.g. indicators related to notifications)?
- (iii) Should new indicators be included?
- (iv) Is a new weighting of the indicators required?
- (v) Should the current scale definition be maintained?
- (vi) Is a trend analysis based on the barometer results possible?

1.2. Methodology

This opinion is based on evidence from scientific literature, on expert opinion and on data obtained from the Belgian Federal Agency for the Safety of the Food Chain (FASFC). The Opinion of the Scientific Committee has been provisionally approved on 13 January 2017 and then submitted for an open consultation to the members of the Advisory Committee of the FASFC and to specific stakeholder groups (members of PLASUR – national consultation platform for surveillance of animal diseases and zoonoses).

2. Definitions & Abbreviations

FASFC	Belgian Federal Agency for the Safety of the Food Chain
AHI	Animal health indicator
Indicator	A measure for rendering and analyzing certain problems or issues. An indicator synthesizes or simplifies relevant data about the state or evolution of a number of phenomena or symptoms. An indicator represents a reality that is in itself not entirely perceptible. It is an instrument that is intended for communication and support in the decision making process, and it can assume either a quantitative (cardinal) form or a qualitative (nominal or ordinal) form (SciCom, 2010).
IP	Improvement potential; the difference between the indicator objective and the median of the indicator results obtained during previous years
SciCom	Scientific Committee of the FASFC
SCS	Self-checking system, i.e. a food safety management system based on good working practices and HACCP (Hazard Analysis Critical Control Points), http://www.favv.be/autocontrole-en/default.asp . In the primary production sector, self-checking pertains to compliance with hygiene requirements and keeping the necessary registers.
SWOT	strengths, weaknesses, opportunities and threats

Considering the discussions during the work group meetings on 20/06/2014, 13/11/2014, 04/05/2015, 04/05/2015, 06/02/2015, 29/02/2016 and during the plenary sessions of the Scientific Committee on

21/02/2014, 21/11/2014, 27/02/2015, 27/03/2015, 18/03/2016, 13/01/2017 and 20/04/2018 and the remarks formulated during the open consultation of 15/09/2017 ([Appendix 5](#)),

the Scientific Committee gives the following scientific opinion:

3. Introduction

The barometer of the safety of the food chain is an instrument, developed by the Scientific Committee (SciCom) of the Belgian Federal Agency for the Safety of the Food Chain (FASFC), allowing to provide on a yearly basis a general image of the state of the safety of the food chain in Belgium (SciCom, 2010). In order to get a view of the safety of the entire food chain (from farm to fork), food safety as well as animal and plant health need to be considered. Given that the state of these 3 subareas may differ significantly and that they are not always interrelated and concern other stakeholders, it was chosen to measure their state separately by means of 3 different barometers, namely the food safety barometer, the animal health barometer and the plant health (phytosanitary situation) barometer. The current opinion specifically concerns the animal health barometer.

The animal health barometer (version 1.0) consists of a basket of 13 carefully chosen, measurable indicators (animal health indicators or AHI) which together reflect the general health of the Belgian livestock population. This set of indicators covers all stages of the entire primary animal production sector (producers, traders, collection centres, transportation, artificial insemination centres, embryo collection teams, slaughterhouses and fishmarkets) and the 14 animal groups or species (cattle and (veal) calves, pigs, small ruminants, solidungulates, poultry and ratites, cervids, bees, rabbits, farmed game, fish, molluscs and shellfish).

The indicators are related to the preventive approach (notification of mandatory notifiable animal infectious diseases, self-checking for the primary animal production sector, traceability and notification of ruminant abortions), production process control (inspection and audits), mortality data and antimicrobial resistance in indicator bacteria, while others represent observations made by official veterinarians during slaughterhouse inspections. The majority of the indicators are measured within the context of the control program of the FASFC, allowing a simple annual monitoring (SciCom, 2011). Given the different impact of the 13 indicators upon animal health, their relative importance was weighted by the various stakeholders of the food chain, i.e. risk managers, the Advisory Committee (including representatives of other public administrations and of the various sector and consumer organizations) and the Scientific Committee of the FASFC (SciCom, 2012).

Based on the difference between the results of the animal health indicators for two successive years, the average of these differences in terms of percentage and taking into account the relative importance of each indicator gives the final value of the barometer. The result of the barometer is expressed as a comparison to the state of a previous year as it is difficult to express animal health in absolute figures, since animal health depends, among other things, on standards or action limits defined on a policy-level and liable to changes.

The barometer results are published annually in the FASFC's annual reports and are available on the FASFC's website (<http://www.favv.be/scientificcommittee/barometer/>).

Given that the animal health barometer covers already a period of several years, the SciCom is asked to evaluate the barometer conceptually. As a first step in this evaluation, the strengths, weaknesses, opportunities and threats (SWOTs) of the barometer were identified in order to examine to what extent it answers to the needs and to determine in which direction it should evolve.

4. SWOTs of the barometer (*barometer version 1.0*)

A SWOT analysis of the barometer was performed among the SciCom members and the risk managers of the FASFC. The main results of this analysis are summarized in [Appendix 1](#).

The analysis showed that the barometer is a strong instrument to display the evolution of the situation of the safety of the food chain in a simple way, but that there are some issues of improvement to be addressed, both in terms of communication (such as raising awareness among consumers and operators, interpreting the barometer result) as regarding the concept itself (including the relevance and interpretation of some indicators, the weighing of indicators, the scale definition of the barometer results) .

5. Basket of indicators

Numerous controls and inspections are routinely conducted by the FASFC in order to monitor and control animal health and the related activities by the operators. It would be too complex and unworkable to incorporate all the results into the barometer, the more that an overview of most of these data is published in the annual reports of the FASFC (<http://www.favv-afsc.fgov.be/rapportsannuels/>) or other authorities, institutions or organizations. Therefore, it was decided to work with a set of indicators. An indicator synthesizes or simplifies relevant data about the status or evolution of a number of phenomena or symptoms. An indicator can assume either a quantitative or a qualitative (nominal or ordinal) form (SciCom, 2011; Depoorter et al., 2015).

Each indicator provides information about a partial aspect of the animal production chain and the monitoring of each indicator enables to achieve a trend analysis of this particular aspect. The animal health indicators (AHI) used in the animal health barometer are not performance indicators, in the sense that they are not meant for evaluating the performance level of a certain set of activities neither of the performance of the Veterinary Services as is often done in a management context where the goals have been clearly set. The AHIs are basically descriptive in nature (SciCom, 2011; Depoorter et al., 2015).

During 7 consecutive years data has been gathered for the different indicators of the animal health barometer. These AHI's have been evaluated by the SciCom based on 4 criteria:

- How did the indicator evolve over the years?
- External validation / biological evolution (Does the evolution of the indicator correspond with the expectations? / Does the evolution correspond with the experiences (perception) on the ground?)
- Relevance of the indicator
- Is it possible / needed to define a new AHI?

Furthermore, an objective was set for every indicator in order to be able to calculate the barometer 2.2 (measurement against predefined objectives – for more details see [chapter 6](#)). For each indicator, an ambitious but yet realistic objective is set.

During the second step of the revision process of barometer version 1.0., each previously defined indicator was reviewed. An overview of the indicators kept, changed, or newly defined together with a short justification is given in [Appendix 2](#).

In general, all indicators were still deemed relevant and therefore kept. Only AHI 5 (Animal welfare inspections) had to be removed from the basket of indicators. Although this indicator is still relevant, it cannot be calculated anymore because the inspection of animal welfare has recently become a part of the competences of the regions and the former scoring system of the FASFC is no longer applied. On the other hand, two new indicators have been added:

- AHI14 - Relative number of outbreaks of notifiable animal diseases: A major drawback of AHI1 (Notification of mandatory notifiable animal diseases) is that it does not take the number of outbreaks but only the occurrence or absence of a disease into account. In that way, a large epidemic would have almost no influence on the animal barometer, especially if the disease

does not cause a rise in mortality. Therefore, it is recommended to add a new indicator which does take the number of outbreaks into account.

- AHI15 - Antimicrobial consumption in animal production: This new indicator registers the annual consumption of antimicrobials of production animals in Belgium (relative to the total biomass of production animals). Antimicrobial consumption is directly linked with animal health and the occurrence of antimicrobial resistance amongst commensal and pathogenic bacteria.

[Table 1](#) gives an overview of the new AHI basket. The following three categories of indicators can be distinguished:

- (i) indicators related to the preventive approach,
- (ii) indicators related to the control of animal products, and
- (iii) indicators related to general animal health

For each AHI, a detailed technical data sheet is available ([Appendix 3](#)). Each indicator is discussed in terms of the RACER criteria. RACER stands for “relevant, accepted, credible, easy to monitor and robust” (MANCP, 2015). More explanation on the RACER criteria as applied to AHIs is given in [Appendix 4](#). From the technical data sheets, it is clear that each indicator has its own possibilities and limitations.

Table 1. Overview of the new basket of animal health indicators

Name		Description
Preventive approach		
AHI1	Notification of mandatory notifiable animal diseases	The percentage of the various mandatory notifiable animal diseases that occur in Belgium annually in comparison with the total number of mandatory notifiable animal diseases. (currently 70). The presence or absence of a disease for the year in question is recorded but not the number of outbreaks of each disease
AHI2	Self-checking for the primary animal production sector	The percentage of establishments in the primary animal production sector having a validated/certified self-checking system (SCS) covering all their activities.
AHI3	Inspections of infrastructure, facilities and hygiene	The percentage of annual inspections with regard to infrastructure, facilities and hygiene that were deemed to be favorable evaluation or favorable, with remarks.
AHI4	Traceability inspections	The percentage of annual inspections relating to traceability in the animal production sector that were deemed to be favorable or favorable, with remarks.
AHI5	Animal welfare inspections	The percentage of annual inspections related to animal welfare that were scored ‘favorable’ or ‘favorable with remarks’
AHI6	Notification of ruminant abortions	The percentage of bovine, sheep and goat abortions tested annually in relation to the total number of females above 24 months of age.

AHI14	Relative number of outbreaks of notifiable animal diseases	The number of outbreaks of notifiable animal diseases relative to the number of farms for every susceptible species
Control of animal products		
AHI7	Bulk tank somatic cell count	The percentage of bovine tank milk samples for which the number of cells is below or equal to 400,000 mL ⁻¹ annually.
AHI8	Pig carcasses declared non-compliant	T The annual percentage of pig carcasses declared non-compliant at slaughter.
AHI9	Antimicrobial 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 the monitoring of indicator bacteria, which are sensitive to all of the antimicrobials tested.
AHI12	Poultry carcasses declared non-compliant	The annual percentage of poultry carcasses declared non-compliant at slaughter.
Animal health		
AHI10	Mortality of slaughter pigs	The annual mortality percentage of fattening pigs compared to the number of slaughtered pigs.
AHI11	Mortality of small ruminants	The annual mortality percentage of small ruminants (sheep and goats) compared to the total number of small ruminants.
AHI13	Mortality of veal calves	The annual mortality percentage of veal calves compared to the number of calves reared at veal calf holdings.
AHI15	Antimicrobial consumption in animal production	The annual consumption of antimicrobials (in kg active ingredient) relative to the total biomass of productions animals in Belgium

6. Calculation of animal health status

Two approaches are proposed for calculating the food safety status, namely (i) as a measurement in terms of a change of the status compared to the previous year (i.e. informative instrument), and (ii) as a measurement against predefined objectives (i.e. more a policy-oriented instrument).

6.1. Measurement in terms of change (Barometer version 2.1)

Similarly to the previous version of the barometer (version 1.0), the final barometer result (version 2.1) is calculated as the average in terms of percentage of the differences between the results of the indicators for two successive years (see eq. 6.1.1. & 6.1.2.).

$$\text{Barometer 2.1 year}_x = \frac{\sum_{i=1}^n \text{result indicator}_i}{n} \quad (\text{eq. 6.1.1.})$$

with

$$\text{result indicator}_i = \left[\frac{\text{result year}_x - \text{result year}_{(x-1)}}{\text{result year}_{(x-1)}} \right] \times 100\% \quad (\text{eq. 6.1.2.})$$

Remark that the sign of the indicator result is reversed when an increase of results corresponds to a negative change in terms of animal health. This is the case for the indicators AHI1 and AHI15

(notification of animal diseases), AHI10, AHI11 and AHI13 (mortality figures) and AHI8 and AHI12 (pig carcasses and poultry carcasses declared non-compliant), for which a decrease indicates an improvement of the overall animal health status.

The advantages of this approach are that it is straightforward, and that the expression of the state in relative terms (and not as an absolute figure) leaves room for potential changes e.g. regarding action limits or on policy-level. In this respect, 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 on the longer term, both at the level of the individual indicators as at the level of the barometer itself (across all indicators).

6.2. Measurement against predefined objectives (Barometer version 2.2)

In the previous opinion regarding the development of the barometer – version 1.0 (SciCom, 2011), “animal health indicator” was defined as “an indicator that provides broad-scoped information about the overall animal health situation. The Animal Health Indicator (AHI) 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 give an appreciation of the actual performance level with regard to any given activity.” In the same opinion it was concluded that policy goals regarding animal health are not quantitatively defined, neither in national documents, nor in European documents, but if more measurable goals would be available for specific points of interest, a further objective assessment with regard to the improvement of the safety of the food chain would be simplified.

In what follows, a proposition is made for measuring the food safety status in relation to predefined objectives. This allows a better visualization of positive or negative evolutions (signals) of individual indicators compared to the objectives (in terms of conformity, for instance).

6.2.1. Defining the objective

For each indicator, an ambitious but yet realistic objective is set (see [technical sheets](#)). For example, for the indicators related to the control of products and facilities, the final goal is set at 100% conformity. Notice that 100% conformity is in reality not 100% when taking the uncertainty into account (i.e. 0% risk does not exist) and given that the aim of the FASFC control plan is to detect with a certain confidence level the non-conformities exceeding a predefined prevalence level (Maudoux et al., 2006). Nevertheless, the determination and the final validation of the objectives to achieve should be performed by the risk management.

For the purpose of evaluating the evolution of the indicators towards their predefined objective, the objectives have to remain fixed over a sufficiently long period of time (e.g. for 6 years).

The fact that an objective is not reached should be viewed as an indication for a need for more controls and/or better support of or communication to the stakeholders rather than problems at the level of animal health.

6.2.2. Measurement of the results towards the objectives

When considering the difference between the indicator result and the indicator objective in absolute terms, the same indicators as in the barometer version 1.0 and version 2.1 will determine the yearly fluctuations of the final barometer result. Moreover, system indicators such as the indicators related to preventive measures (i.e. the presence of validated self-checking systems and inspections) that are

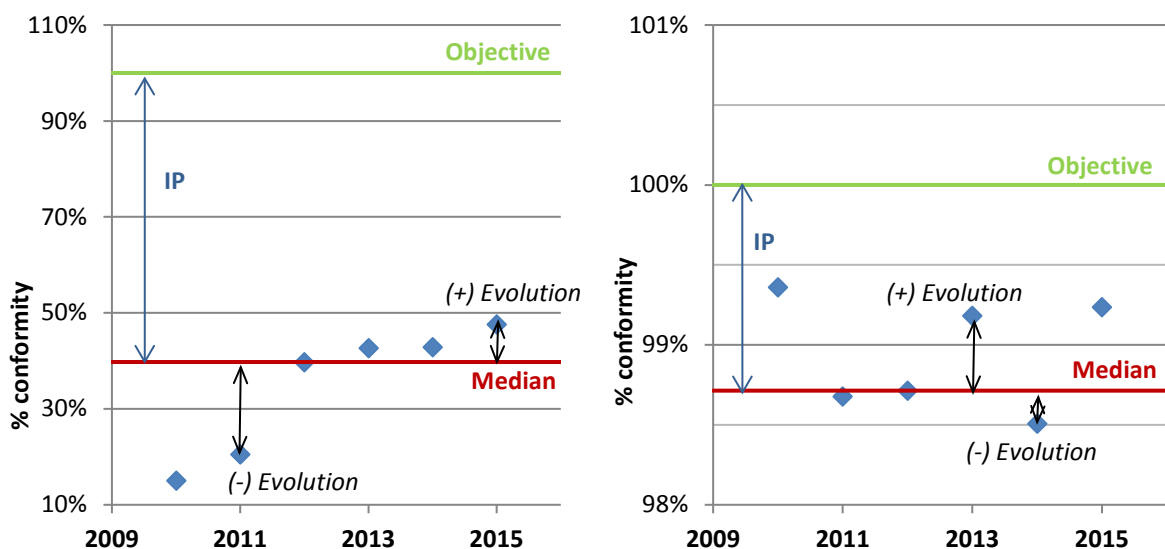
more influenced by incentives taken, have a higher margin for reaching the objective in comparison with the indicators related to product controls that show already each year a high level of conformity. To level out this difference, the objective for each indicator is expressed in terms of a (theoretical) improvement potential (IP). The IP is defined as the difference between the objective and the median of the results obtained during previous years (see eq. 6.2.2.). The time frame considered for calculating this median can be ‘static’, i.e. a fixed period of X years, or ‘dynamic’, i.e. a ‘X-years moving window’ (e.g. of 6 years, i.e. 2 business plan cycles). In this way, the already documented information as well as the evolution of the indicator results are taken into account. A consequence of a ‘moving window’ is that at a certain point in time results of a given year will no longer be considered for the barometers. Moreover, if a positive evolution of the state is observed (via barometer version 2.1), it might become more difficult to bridge the margin of improvement. Since a positive evolution implies an increase of the median value, barometer version 2.2 results might become less positive. On the other hand, extreme values will no longer influence the median value. The use of a ‘moving window’ can additionally be argued by the fact that pressures on the food chain, such as society, regulations, climate change, etc. that might impact the food chain safety state, change. Moreover, it allows the opportunity of linking objectives laid down in advance by policy with indicators to be followed during e.g. a MANCP (Multi Annual National Control Plan) cycle (see ‘opportunities’ SWOT, [Appendix 1](#)). Similarly as remarked for the objectives, the window or timeframe considered should cover a sufficiently long period in order to be able to evaluate the evolution of the indicators towards their predefined objective.

$$result\ indicator_i = \left[\frac{result\ year_x - median_i}{IP_i} \right] \times 100\% \tag{eq. 6.2.1.}$$

with

$$IP_i = [objective_i] - [median_i] \tag{eq. 6.2.2.}$$

The indicator result is expressed relatively to the IP in terms of percentage as the difference between the reported result of a given year, and the median result of previous years or of a given timeframe (eq. 6.2.1.). The expression of the indicator results compared to an objective and in terms of an IP is illustrated for 2 examples in Figure 1.



a) Example of an indicator with a large IP

b) Example of an indicator with a limited IP

Figure 1. Illustration of the expression of the indicator result compared to its objective and in terms of its improvement potential (IP)

6.2.3. Representation of the state

The three categories of indicators, namely the indicators related (i) to the preventive approach, (ii) to the control of animal products and (iii) to animal health, are influenced by different kind of pressures on the animal production chain and reflect different aspects of the animal health situation. For instance, the indicators related to the preventive approach refer to pro-active actions taken for preventing hazardous animals/animal products from entering the market whereas the indicators related to the control of processes and animal products and those related to animal health measure more directly the animal health state. Therefore, preference is given to a representation of the state against predefined objectives for each indicator category separately. A color scale can be used as a practical communication tool to indicate which indicators are potentially a point of concern (alert signal, cf. traffic light).

Similarly to barometer version 2.1, version 2.2 allows anticipating potential changes or pressures on animal health and the observation of trends of the overall situation on the longer term, both at the level of the individual indicators as at the level of the indicator categories.

7. Discussion of results

7.1. *New animal health indicators*

An overview of the results reported between 2011 and 2015 for the new AHI basket is given in [Table 2](#). The evolution of changes observed is briefly discussed for each AHI in its technical sheet (see [Appendix 3](#)). Similarly to the previous indicator basket (barometer version 1.0), the main changes are observed for the indicators related notifications and for the indicators related to animal health, followed by the indicators related to the control of animal products.

The indicators related to the preventive approach (AHI 1, 2, 3, 4, 5, 6 and 14) show a different trend between 2011 and 2015. The two indicators on notifications of animals diseases (AHI1 and 14) show no real evolution over the last 5 years, although the change from one year to the following can be substantial. The indicator on notifications of ruminant abortions (AHI6) shows a positive trend over the last 5 years. This is mainly due to the installation of the 'abortion protocol' by the government which encourages farmers to notify abortions and provide abortive tissues for laboratory analysis (with-out supplementary costs). The indicator regarding the percentage of establishments in primary animal production having a validated SCS (AHI2) shows a gentle decrease in recent years while a strong increase has been noted in 2012. This decreasing trend must however be followed up in the upcoming years to allow a definitive conclusion. Regarding the indicators related to the control of processes (AHI3, 4 and 5), the results show that they do not change a lot although they show a high level of conformity. Only AHI 4 (traceability inspections) shows a negative evolution. The latter is mainly due to less favorable results of the inspections regarding the identification and registration of sheep, goats and cervids. Given that these indicators cover several processes in different animal production segments, they are not omitted from the indicator basket. Moreover, 'no change' also includes information regarding animal health, namely it being 'status quo' with respect to the safeguarding of animal health.

The results of the indicators related to animal health (AHI10, 11, 13 and 15) generally show a positive trend over the last five years. Only AHI11 (mortality of small ruminants) shows no real trend. The mortality of veal calves (AHI13) shows on the other hand a very positive evolution, mainly because of the ongoing eradication campaign against the BVD virus in cattle. Also the new indicator on

antimicrobial consumption in animal production (AHI15) shows a positive trend following the efforts made by various stakeholders and government institutions to reduce antimicrobial consumption.

The results of the indicators regarding the control of animal products (AHI7, 8, 9 and 12) show an overall positive evolution over the 5 years. This is in particular the case for AHI9 (antimicrobial resistance in *E. coli* indicator bacteria) which is in line with the reduction of antimicrobial consumption in animal production (AHI15). Only the indicator regarding the number of pig carcasses declared non-compliant shows a negative evolution between 2011 and 2015 (i.e. a rise in the number of pig carcasses declared non-compliant).

7.2. Animal health Barometer 2.1

Based on the new indicator basket, the animal health state expressed relatively to the state of a previous year (6.1.) shows overall no real evolution when compared to the state in 2011 (Table 2). Results indicate the highest change in 2013 and 2014, with an improvement of the animal health state with 8,06% and a deterioration of 10,79% respectively compared to the previous year.

Overall, the indicators related to notifications of animal diseases and bovine abortions (AHI1, 6 and 14) together with the indicator on antimicrobial resistance in *E. coli* indicator bacteria (AHI9) appear to have the highest impact on the global barometer version 2.1 results.

Notice that the global results for barometer version 2.1 cannot be compared as such with the global results reported for barometer version 1.0. Not only the indicator basket changed (including a different interpretation of the indicator related to notification of notifiable diseases – AHI1), but also no weighing of the indicators has been included in the barometer version 2.1. as is presented, as a result of which each indicator has a similar impact on the final barometer 2.1 result.

Table 2. Overview of the Animal health barometers versions 2.1 from 2012 until 2015

Animal health barometer 2.1.						Change in	Change in	Change in	Change in
AHI	Result	Result	Result	Result	Result	compared	compared	compared	compared
	2011	2012	2013	2014	2015	to 2011	to 2012	to 2013	to 2014
1	9,59%	16,44%	8,22%	11,43%	10,00%	-71,43%	50,00%	-39,05%	12,51%
2	21,99%	25,33%	26,11%	25,70%	23,82%	15,19%	3,08%	-1,57%	-7,32%
3	97,26%	97,20%	95,89%	96,99%	97,95%	-0,06%	-1,35%	1,15%	0,99%
4	95,07%	93,36%	88,50%	85,71%	84,38%	-1,80%	-5,21%	-3,15%	-1,55%
5	97,40%	97,30%	95,90%	97,36%	/	-0,10%	-1,44%	1,52%	/
6	0,52%	0,74%	0,61%	0,67%	0,74%	42,31%	-17,57%	9,84%	10,45%
7	90,05%	89,55%	91,15%	91,31%	91,44%	-0,56%	1,79%	0,18%	0,14%
8	0,16%	0,16%	0,17%	0,19%	0,19%	0,00%	-6,25%	-11,76%	0,00%
9	20,92%	19,06%	25,42%	34,15%	37,56%	-8,89%	33,37%	34,34%	9,99%
10	3,74%	3,21%	2,88%	2,97%	3,14%	14,17%	10,28%	-3,13%	-5,72%
11	10,28%	10,74%	11,56%	10,66%	10,36%	-4,47%	-7,64%	7,79%	2,81%
12	0,79%	0,78%	0,65%	0,59%	0,63%	1,27%	16,67%	9,23%	-6,78%
13	5,35%	5,46%	4,64%	4,42%	3,84%	-2,06%	15,02%	4,74%	13,12%
14	0,0158%	0,0243%	0,0185%	0,0501%	0,0174%	-53,80%	23,87%	-170,81%	65,27%
15	146,69	136,51	128,02	129,42	123,4	6,94%	6,22%	-1,09%	4,65%
Global						-4,22%	8,06%	-10,79%	7,04%

Legend:

The sign of this indicator was changed, because a decrease of this indicator actually shows an improvement of the animal health state and vice versa.

7.3. Animal health Barometer 2.2

Based on the new basket of animal health indicators ([Table 1](#)) and compared to their respective predefined objective ([6.2](#)), [Table 3](#) illustrates the animal health barometer version 2.2 approach. For the purpose of comparing 2 years, the median was calculated based on a fixed period of 3 years (2011-2013), which is a relative short timeframe.

The discussion of the barometer version 2.2 results can be based on quantitative measures by comparing the AHI results with their IP in terms of percentage (preferentially per AHI category) or on qualitative observations by means of a color scale. The colors in [Table 3](#) are based on a conditional 3-color scale, going from dark red for the minimum AHI result observed in 2014-2015, over yellow for an AHI result of 0%, to dark green for an AHI result of 100% (meaning that the objective for the AHI is reached).

For example, comparison between the different AHI categories shows that in 2015 a positive evolution towards the objectives is observed for the AHIs related to preventive measures (an increase from -42,09% to -12,58%), and for the AHIs related to animal health (from +28,58% to +38,31%) while the AHIs related to the control of animal products show hardly any evolution (from +14,20% to +14,32%). Within the AHI category of preventive measures, it can be observed from the color scale that this negative result is mainly due to AHI 14 (Relative number of outbreaks of notifiable animal diseases) and AHI4 (traceability inspections). This implies that supplementary attention could be given to the control of traceability systems in animal production (AHI4) notwithstanding the relatively high conformity level observed for this AHI. An opposite observation can be made for the mortality of veal calves (AHI13) which turns from dark green in 2014 to even darker green in 2015, indicating results above (lower mortality) the median result of 2011-2013 as well as an evolution towards its objective which is most likely due to the ongoing eradication schemes for BVD- and IBR-virus in the cattle industry.

Considering the change of each indicator in 2015 compared to the IP, it can be observed that the animal health barometer version 2.2 is mainly determined by AHIs 4, 6 and 13 with respective change percentages of -135,24%, +33,33% and +95,63%. In general, it appears that AHIs which displayed little change between 2014 and 2015 in the barometer version 2.1 show now a more important change in barometer version 2.2. This is in particular the case for the AHIs regarding the control of processes (AHI3 and 4).

The timeframe to be considered for calculating the median value, which serves as a reference point, can be based on management criteria (see [6.2.2](#)). It is a determining factor in this approach as it has an influence on the relative changes observed within the AHI categories. The shorter this timeframe the smaller the basis for comparing one year to another and the less stability in the positive/negative tendencies observed.

It should be kept in mind that the barometer 2.2. results presented in [Table 3](#) only cover a small time frame, possibly too small for drawing firm conclusions. Nevertheless, they illustrate the signal function of barometer version 2.2., enabling to identify the animal health areas that might receive additional attention. Barometer version 2.2 should be viewed complimentary to barometer version 2.1. It is optional to show the quantitative results or only the color scale.

Table 3. Barometer version 2.2 results: years 2014 & 2015 (based on a fixed 3-year window)

AHI	Short description ^(a)	OBJ	Median ^(b) 2011- 2013	IP ^(c) 2010- 2014	Relative evolution towards objectives ^(d)					
					Individual AHI result		Color scale according to AHI category ^(e)		Mean per AHI category	
					2014	2015	2014	2015	2014	2015
Preventive approach										
1	Notification of mandatory notifiable animal diseases	0%	9,59%	9,59%	-19,19%	-4,28%				
2	Self-checking for the primary animal production sector	100%	25,33%	74,67%	0,50%	-2,02%				
3	Inspections of infrastructure, facilities and hygiene	100%	97,20%	2,80%	-7,50%	26,79%				
4	Traceability inspections	100%	93,36%	6,64%	-115,21%	-135,24%				
5	Animal welfare inspections	100%	97,30%	2,70%	2,22%	/			-42,09%	-12,58%
6	Notification of ruminant abortions	0,61%	0,39%	15,38%	33,33%	0,61%				
14	Relative number of outbreaks of notifiable animal diseases	0%	0,02%	0,02%	-170,81%	5,95%				
Control of products										
7	Bulk tank somatic cell count	100%	90,05%	9,95%	12,66%	13,97%				
8	Pig carcasses declared non-compliant	0%	0,16%	0,16%	3,04%	3,04%			14,20%	14,32%
9	Antimicrobial resistance in <i>E. coli</i> indicator bacteria	100%	20,92%	79,08%	16,73%	21,04%				
12	Poultry carcasses declared non-compliant	0%	0,78%	0,78%	24,36%	19,23%				
Animal health										
10	Mortality of slaughter pigs	2,59%	3,21%	0,62%	38,83%	11,33%				
11	Mortality of small ruminants	9,25%	10,74%	1,49%	5,38%	25,54%			28,58%	38,31%
13	Mortality of veal calves	3,77%	5,35%	1,58%	58,90%	95,63%				
15	Antimicrobial consumption in animal production	73,35	136,51	63,17	11,22%	20,76%				
Global					-8,23%	9,65%				

^(a) more information is given in the AHI technical sheets ([Appendix 3](#)); ^(b) median value of individual AHI results (see [Table 2](#)) over a fixed 3-year period of 2011 to 2013; ^(c) improvement potential (IP) = objective – median; ^(d) relative change compared to the objective calculated as: [(AHI result-median) / IP] x 100%; ^(e) 3-color scale comparing the relative evolution towards the objectives for the 15 AHIs over 2 years (going from a red color for the most negative evolution towards a green color for the most positive evolution)

8. Answer to the questions

(i) Are the current indicators still relevant?

As was mentioned in SciCom opinion 09-2011 (SciCom, 2011), the composition of the indicator basket may vary from time to time. Given that the barometer version 1.0 already covers a large period (composed in 2010 with data going back to 2007), the indicator basket was evaluated according to a number of criteria (see [5](#)). This resulted in a new basket containing 15 AHIs, which were evaluated in terms of their relevance, acceptability, credibility, easiness to monitor and robustness (i.e. RACER criteria – [Appendix 4](#) & technical sheets – [Appendix 3](#)). An overview of the indicators kept, changed, or newly defined together with a short justification is given in [Appendix 2](#).

(ii) How to deal with the indicators whose interpretation is open to debate?

With respect to the animal health barometer, the indicator related to the notification of mandatory notifiable animal diseases is an indicator which interpretation appeared to be a point of discussion. This indicator was perceived in barometer 1.0 as a reflection of the vigilance for animal diseases in the field. However, it seems that there has not been a clear correlation with the true prevalence of notifiable animal diseases during recent years. Furthermore, the list with notifiable animal diseases has been adapted in the beginning of 2014 by removing a number of ‘endemic’ notifiable diseases (e.g. footrot, rabbit hemorrhagic disease, myxomatosis, ...), which were major influencers of the result of this indicator, of the list. Lastly, the interpretation of this indicator (rise in notifications of disease is positive= better vigilance) remains difficult and hard to communicate to a general public.

For the reasons above, it has been decided to adapt the interpretation of this indicator in barometer 2.1 and 2.2: a rise in notifiable diseases is now interpreted as an deterioration of animal health. In other words: this indicator is no longer a measure for the vigilance of operators and veterinarians but rather a measure for the prevalence of notifiable animal diseases in the field.

(iii) Should new indicators be included?

A number of new indicators are proposed to be included into the new version of the barometer (see [5](#), and [Appendix 2](#)).

(iv) Is a new weighing of the indicators required?

The appraisal of the indicators in function of their direct relationship to animal health as perceived by various stakeholders of the animal production chain, has been identified as one of the strengths of the barometer (see SWOT analysis, [Appendix 1](#)). Given that some time has elapsed since the stakeholders were consulted on the relative importance of AHIs, and given that new indicators are included into the barometer, a new weighing is recommended. Weighing factors can be applied in the two proposed barometer approaches (barometer version 2.1 and version 2.2).

Notice that this assessment should only concern the relative importance of the indicators for animal health, not the objectives targeted for the AHIs.

(v) Should the current scale definition (barometer version 1.0) be maintained?

The opinion presents two approaches that can be used complementary (see [6](#)).

The advantage of the scale applied for barometer version 1.0 and version 2.1 is that it is based on a straightforward calculation, by which the state of a given year is directly compared with the state of a previous year. A positive barometer result corresponds to a favorable evolution of the state, whereas a negative result indicates an unfavorable evolution. As such, barometer 2.1 is a useful instrument for communication. Nevertheless, the weaknesses identified in the SWOT regarding the interpretation of the absolute value of the barometer result and the fact that fluctuations of the barometer results can mostly be reduced to changes of a limited (and mostly the same) indicators, remain.

Therefore, alternative scales were looked at. Still, the difficulty remains that animal health is not an absolute condition. However, by introducing an ‘animal health goal’, a reference point is introduced.

In this sense, an alternative scale definition is proposed based on predefined objectives for the different AHIs. As such, this approach – barometer version 2.2 – has an added informative value and could be used in policy support.

(vi) **Is a trend analysis based on the barometer results possible?**

A trend ‘analysis’, or rather a trend ‘observation’ is possible in the sense that it in fact reflects what can be visually observed from the barometer results over a larger time frame. It is to be noted that although the final barometer result is used as a first line of communication, the actual evaluation of the animal health state is based on the individual indicator results. Only what has been measured, is observed. Consequently, since the basket of AHIs does not include all of the potential risks or hazards that might occur, it is possible that specific incidents are not picked up by the barometer. The primary goal of the barometer is to conduct a measuring of animal health status and evolution on the basis of indicators that are directly or indirectly related to monitoring and to ensuring of animal health throughout the entire animal production chain, and not to conduct a comprehensive “all-in” risk-evaluation or a measurement of the animal health status.

9. Conclusions

The animal health barometer (version 1.0) was revised resulting in a new basket of 15 animal health indicators. Two approaches are proposed for calculating the animal health status, namely (i) as a measurement in terms of a change of the status compared to the previous year (i.e. version 2.1, with a similar approach as used for version 1.0), and (ii) as a measurement against predefined objectives (i.e. version 2.2).

In this sense, both approaches complement each other since the first approach or barometer version 2.1 is rather a communication tool, whereas the second approach or barometer version 2.2 is a more policy-oriented instrument.

The current opinion concerns the evaluation of the concept of the animal health barometer on a scientific basis. Although the Scientific Committee proposed a methodology of approach, it is up to the risk management to turn the concept into reality, amongst others with respect to predefined objectives, the chosen window of comparison, etc. Additional refinement of the barometer versions might consist of a weighting of the indicators in function of their direct relationship to animal health as perceived by various stakeholders of the animal production chain.

For the Scientific Committee,
Chairman,

Prof. Dr. E. Thiry (Sgd.)
Brussels, 26/04/2018

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Presentation of the Scientific Committee of the FASFC

The Scientific Committee is an advisory body of the Belgian Federal Agency for the Safety of the Food Chain (FASFC) that provides **independent scientific opinions** on risk assessment and risk management in the food chain, and this at the request of the Chief Executive Officer of the FASFC, the Minister competent for food safety or at its own initiative. The Scientific Committee is administratively and scientifically supported by the Staff direction for Risk Assessment of the Agency.

The Scientific Committee consists of 22 members who are appointed by royal decree on the basis of their scientific expertise in areas related to the safety of the food chain. When preparing an opinion, the Scientific Committee can call on external experts who are not a member of the Scientific Committee. Similar to the members of the Scientific Committee, they must be able to work independently and impartially. To ensure the independence of the opinions, potential conflicts of interest are managed transparently.

The opinions are based on a scientific assessment of the question. They express the view of the Scientific Committee which is taken in consensus on the basis of a risk assessment and the existing knowledge on the subject.

The opinions of the Scientific Committee may contain **recommendations** for food chain control policy or for the stakeholders. The follow-up of these recommendations for control policy is the responsibility of the risk managers.

Questions on an opinion can be directed to the secretariat of the Scientific Committee:

Secretariat.SciCom@afsca.be.

Members of the Scientific Committee

The Scientific Committee 2013-2017, which has prepared the preliminary opinion, was composed of the following members:

D. Berkvens, A. Clinquart, G. Daube, P. Delahaut, B. De Meulenaer, S. De Saeger, L. De Zutter, J. Dewulf, P. Gustin, L. Herman, P. Hoet, H. Imberechts, A. Legrève, C. Matthys, C. Saegerman, M.-L. Scippo, M. Sindic, N. Speybroeck, W. Steurbaut, E. Thiry, M. Uyttendaele, T. van den Berg

The Scientific Committee 2013-2017, which has published the final opinion, is composed of the following members:

S. Bertrand*, M. Buntinx, A. Clinquart, P. Delahaut, B. De Meulenaer, N. De Regge, S. De Saeger, J. Dewulf, L. De Zutter, M. Eeckhout, A. Geeraerd, L. Herman, P. Hoet, J. Mahillon, C. Saegerman, M.-L. Scippo, P. Spanoghe, N. Speybroeck, E. Thiry, T. van den Berg, F. Verheggen, P. Wattiau

* until 23/03/2018

Conflict of interest

No conflicts of interest were notified.

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Composition of the workgroup

The workgroup was composed of:

Members of the Scientific Committee: J. Dewulf, D. Berkvens*, N. Speybroeck, H. Imberechts*
File manager: P. Depoorter, X. Van Huffel

* until 24/01/2017

Open consultation

In order to increase transparency, but without compromising the independent position of the Scientific Committee, the members of the Advisory Committee and the members of the PLASUR platform (veterinary communication platform) were invited to communicate their comments.

Comments received and the response on these comments are given in annex of the opinion ([Appendix 5](#)).

Legal framework

Law of 4 February 2000, on the creation of the Federal Agency for the Safety of the Food Chain, in particular article 8;

The Royal Decree of 19 May 2000, on the composition 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, as established within the Federal Agency for the Safety of the Food Chain, approved by the Minister on 9 June 2011.

Disclaimer

The Scientific Committee at all times reserves the right to modify the opinion by mutual consent, should new information and data become available after the publication of this version.

Appendix 1: Summary of the results of the SWOT analyses of the barometer



Strengths:

1. the possibility of trend observation
 2. the display of the global state of the food safety, the plant health and the animal health status
 3. the scientific validation
- The barometer was developed by the SciCom and published in peer reviewed journals
4. the calculation of the barometers (the various indicators) stimulates the evaluation and improvement of the quality of the data in the databases and reporting environments
 5. the relative importance of the indicators for food chain safety was assessed by different stakeholders, which increases the acceptance of the barometers



Opportunities:

1. the barometer increases (inter)nationally the visibility of the FASFC
 2. become a promotional tool for the Belgian food chain approach & products
 3. In the context of an ever more harmonized market, the development of a European barometer is a possible opportunity (see also the EU baseline studies) for which the barometer is a possible starting point
 4. linking to the cycle of the "Multi Annual National Control Plan' (MANCP)
- (i) linking of objectives laid down in advance by policy with indicators to be followed during a MANCPs cycle, and (ii) periodic assessment of the relevance of the indicators at the end of a MANCP cycle



Weaknesses:

1. the possible, contradictory interpretation of indicators related to notifications
- In the original sense, these indicators (e.g. mandatory notifications food safety, notifiable animal diseases/plant diseases and pests, reports of bovine abortions) are to be interpreted as a measure of the vigilance of the sector. This may seem contradictory at large deflections in positive or negative sense.
2. the interpretation of the final barometer result
- Is the observed improvement/decrease observed realistic? How should the percentual increase/decrease or the barometer scale be interpreted? The barometer measures is not an absolute condition.
3. the explanation of the final barometer result can often be reduced to fluctuations observed for a limited number of indicators
 4. the barometer is insufficiently known by operators and consumers
- This has more to do with communication than with the barometer itself. However, explanation of the barometer result requires sometimes a too technical explanation.
5. the barometer does not include indicators related to emerging risks / hazards or niche products



Threats:

1. wrong interpretation of the barometer result / objective / concept
- e.g. interpretation of the barometer as a measurement of the functioning of the FASFC or of the health state of the Belgian population. This threat underlines the importance of good communication that includes consideration of the evolution of the food chain safety state over several years.
2. the barometer loses its pertinence
- e.g. because the barometer shows no evaluation anymore, the evolution observed is contradictory to the perception in the field, etc.

Appendix 2: Overview of animal health indicators kept, changed or newly defined.

The indicators that are withdrawn from the new basket are indicated in **red** and those that are kept in **green**. New or alternative indicators that were considered, are given in **blue** if kept and in **grey** if they were not kept.

Indicators related to the preventive approach		
AHI1	Notification of mandatory notifiable animal diseases	This indicator was perceived in barometer 1.0 as a reflection of the vigilance for animal diseases in the field. However, it seems that there has not been a clear correlation with the true prevalence of notifiable animal diseases during recent years. Furthermore, the list with notifiable animal diseases has been adapted in the beginning of 2014 by removing a number of 'endemic' notifiable diseases (e.g. footrot, rabbit hemorrhagic disease, myxomatosis, ...), which were major influencers of the result of this indicator, of the list. Lastly, the interpretation of this indicator (rise in notifications of disease is positive= better vigilance) remains difficult and hard to communicate to a general public. For the reasons above, the SciCom has decided to adapt the interpretation of this indicator in barometer 2.1 and 2.2: a rise in notifiable diseases is now interpreted as an deterioration of animal health. In other words: this indicator is no longer a measure for the vigilance of operators and veterinarians but rather a measure for the prevalence of notifiable animal diseases in the field.
AHI2	Self-checking for the primary animal production sector	The indicator is kept but its scope is broadened to all activities within the animal production chain, not only "key activities" (= activity representing a considerable production volume and/or having a considerable impact on the plant health because of the very nature of the activity) as previously in the plant health barometer version 1.0.
AHI3	Inspections of infrastructure, facilities and hygiene	The indicator is still perceived relevant and is therefore kept.
AHI4	Traceability inspections	The indicator is still perceived relevant and is therefore kept.
AHI5	Animal welfare inspections	This indicator remains relevant. However, it cannot be calculated anymore because the inspection of animal welfare has recently become a part of the competences of the regions and the former scoring system of the FASFC is no longer applied
AHI6	Notification of ruminant abortions	It has been decided to add abortions in small ruminants (sheep and goat) to this indicator, besides the abortions in cattle. This indicator was perceived as a reflection of the vigilance for animal diseases in the field in barometer 1.0. In contrast with AHI1 (see higher), it is recommended to maintain this interpretation for the barometer 2.1 and 2.2: The increase in the number of ruminant abortions from 2010 onward is due to the installation of the 'abortion protocol', which encourages farmers to notify abortions and provide abortive tissues for laboratory analysis (with-out supplementary costs). During this period, there were no field indications that there was an actual rise in the number of ruminant abortions. Therefore, an increase of the number of reported abortions was considered in this context as an indication of

		a substantial degree of vigilance with regard to the safeguarding of animal health and is therefore interpreted as a favorable element.
AHI14	Relative number of outbreaks of notifiable animal diseases	A major drawback of AHI1 (Notification of mandatory notifiable animal diseases) is that it does not take the number of outbreaks but only the occurrence or absence of a disease into account. In that way, a large epidemic would have almost no influence on the animal barometer, especially if the disease does not cause a rise in mortality. Therefore, it is recommended to add a new indicator which does take the number of outbreaks into account.
Indicators related to the control of animal products		
AHI7	Bulk tank somatic cell count	The indicator is still perceived relevant and is therefore kept.
AHI8	Pig carcasses declared non-compliant	In the previous version of the animal health barometer, this indicator only took the non-compliant livers in pigs into account. It has been decided to change the indicator to the registration of the percentage of entire carcasses that were declared non-compliant in pigs (the same indicator as AHI12 for poultry) because this approach possibly gives a broader and more general image of animal health in pigs (for instance monitoring of more pathogens/pathologies).
AHI9	Antimicrobial resistance in <i>E. coli</i> indicator bacteria	The indicator is still perceived relevant and is therefore kept.
AHI12	Poultry carcasses declared non-compliant	
Indicators related to animal health		
AHI10	Mortality of slaughter pigs	The indicator is still perceived relevant and is therefore kept.
AHI11	Mortality of small ruminants	
AHI13	Mortality of veal calves	
AHI15	Antimicrobial consumption in animal production	This new indicator registers the annual consumption of antimicrobials of production animals in Belgium (relative to the total biomass of production animals). Antimicrobial consumption is directly linked with animal health and the occurrence of antimicrobial resistance amongst commensal and pathogenic bacteria. Therefore, an increase in consumption of antimicrobials is considered as a deterioration of the indicator.

Appendix 3: Technical sheets of the indicators of the animal health barometer

AHI01: notification of mandatory notifiable animal diseases				
Description: The percentage of the various mandatory notifiable animal diseases that occur in Belgium annually in comparison with the total number of mandatory notifiable animal diseases. (currently 70). The presence or absence of a disease for the year in question is recorded but not the number of outbreaks of each disease.				
Category: Preventive measures				
Part of the food chain: primary animal production sector				
Animal species: Bovines, sheep, goats, pigs, poultry, horses, lagomorphs, ratites, deer, fish, bees, molluscs, crustaceans, minks				
✓	Relevance of the indicator: Mandatory notifiable disease are infectious diseases that cause socio-economic damage or that have a significant impact on public health, and which are of significance to the international trade of animals and animal products. The percentage of mandatory notifiable animal diseases reported each year is therefore an important indicator for animal health.			
✓	Accepted: Given the tremendous impact of these diseases on animal health at farm level and at country level, farmers and veterinarians are likely to report a (possible) outbreak. Furthermore, there is a legal obligation to report these diseases.			
✓	Credible: The reporting of a mandatory notifiable disease 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 greater degree of vigilance with regard to the hazards and risks.			
✓	Easy to monitor: data are collected by the FASFC			
✓	Robust			
Results:				
Year	Number of notified mandatory notifiable animal diseases	Percentage of mandatory notifiable animal diseases reported	Calculation of the indicator	Limit
2015	7	10,00%	12,51%	Not applicable
2014	8	11,43%	-39,05%	
2013	6	8,22%	50,00%	
2012	12	16,44%	-71,43%	
2011	7	9,59%	0,00%	
Evolution: Although there were some strong variations for this indicator in recent years, no real evolution could be observed (=status quo).				
Possible goal: It should be the objective that no mandatory notifiable animal disease is present in Belgium (=0%).				
Additional information:				
<p>“Mandatory notifiable” means that suspected contamination must be reported immediately by the livestock holder or the veterinarian at the Provincial Control Unit of the FASFC. Once contamination has been confirmed through laboratory examinations, the outbreak must be reported by the authorities within 24 hours to the World Organisation for Animal Health (OIE) and to the European Union (EU). The OIE and the EU then disseminate information to other countries. The measures implemented to combat these diseases are aimed at eradicating or controlling a given disease.</p> <p>The list with mandatory notifiable animal diseases contained 73 diseases until 2013. After an adaption of the law in 2014, the list currently contains 70 diseases. This list can be found at http://www.favv.be/dierengezondheid/zoosanitaire-belgie/</p>				

A notification of a mandatory notifiable animal disease is considered as a deterioration of animal health.

AHI02: Self-checking systems in the primary animal production sector				
Description: The percentage of establishments in the primary animal production sector (based on the principal activity ¹ of registered establishments) having a validated/certified self-checking system (SCS) covering all their activities.				
Category: Preventive measures				
Part of the food chain: primary production sector				
✓	Relevance of the indicator: Independent validation of a SCS enhances its surplus value and makes it more trustworthy with regard to its foundations and functioning. Studies show that the development of a well-functioning self-checking is generally translated in a better performance with respect to food safety ² and inspection results appear to be better when a validated SCS is present ³ .			
✓	Accepted: Operators may freely decide whether or not to have their SCS validated. Absence of a validation does not mean that the SCS is absent or that it does not function properly. However validation by an independent third party is a surplus and credibility.			
✓	Credible: On the basis of a sector guide and performed by means of a check-list, companies can have their SCS validated by a certification or inspection body (OCI) that has been recognized as such by the FASFC. In case there is no approved guide available for a certain sector, or if no OCI has been recognized by the FASFC, the operator may resort to the FASFC for conducting the validation.			
✓	Easy to monitor: data are collected by the FASFC			
✓	Robust			
Results:				
Year	Number of registered establishments ^(a)	% establishments with a validated self-checking system	Calculation of the indicator	Limit
2015	123615	23,82%	-7,32%	Not applicable
2014	129202	25,70%	-1,57%	
2013	129340	26,11%	+3,08%	
2012	121405	25,33%	+15,19%	
2011	112795	21,99%	+45,73%	
^(a) based on the number of establishments having their principal activity (i.e. the activity generating the highest turnover) in the sector concerned				
Evolution: In general a favorable evolution is observed, showing some stagnation in 2014 followed by an further decrease in 2015. The FASFC takes a lot of initiatives to help implement a SCS in businesses and to encourage its validation. Operators with validated SCS benefit from a reduced inspection frequency by the FASFC and a reduction on their annual contribution. The primary production sector has in comparison with other sectors the highest % of validations of their SCS. Remark that the number of registered establishments in the primary production sectors shows a steady increase.				

¹ The principal activity of an operator is the activity that generates the highest turnover.

² Jaxsens L. *et al.* (2015) Measuring microbial food safety output and comparing self-checking systems of food business operators in Belgium. *Food Control* 49, 59-69.

Habib *et al.* (2012) *Campylobacter* contamination in broiler carcasses and correlation with slaughterhouses operational hygiene inspection. *Food Microbiology* 29, 105-112.

Sampers I. *et al.* (2010) Relation between *Campylobacter* contamination and performance of Food Safety Management Systems in the poultry meats industries. *Journal of Food Protection* 73(8), 1447-1457.

Noble S. *et al.* (2009) Frequency and type of food safety infractions in food establishments with and without certified food handlers. *Food Protection Trends* 29, 840-848.






³ FASFC annual report 2013

Possible goal: It should be the objective that, in the end, 100% of the establishments have a validated self-checking system covering all their activities.

Additional information:

Self-checking stands for the entire set of measures that are taken by the operators in order to ensure that all products falling under their responsibility, and for all production, processing and distribution phases, are capable of:

- meeting the legal requirements regarding food safety;
- meeting the legal requirements regarding product or produce quality, which belongs to the competence of the FASFC;
- meeting the requirements regarding traceability and surveillance of effective compliance of these requirements.

AHI03: Inspections of infrastructure & hygiene				
Description: The percentage of inspections with regard to infrastructure, facilities and hygiene that received a favourable evaluation or favourable, with remarks.				
Category: Control of processes				
Part of the food chain: primary animal production sector				
Operators concerned: These inspections were carried out in farms, assembly centers, vehicles, trader premises, semen collection and storage centers and the embryo collection and production teams (bovines, horses, pigs, sheep and goats).				
Animal species: Bovines, sheep, goats, calves, pigs, poultry, horses, rabbits, ratites, deer, farmed game				
	Relevance of the indicator: Good hygiene and appropriate infrastructure and facilities are the basic conditions for maintaining or improving animal health.			
	Accepted: This indicator indicates if operators meet the legal requirements with regard to infrastructure and hygiene. The checklists on which the inspections are based, are available on the website of the Agency ⁴ enabling operators to evaluate if their business is in compliance with regulations.			
	Credible: The result of an inspection is determined on basis of a checklist, by which a fixed appraisal, under the form of a points score, will made for each item to be controlled, and in function of its relative importance. As for the results of any inspection, there are 3 possibilities: either favorable, favorable with remarks or unfavorable. The latter will result in further measures to be taken or in the drawing up of an official report.			
	Easy to monitor: data are collected by the FASFC			
	Robust: Changes to the evaluation system (e.g. new checklist or appraisal system) might occur and result in a year-to-year difference. Additionally it should be accounted for that the inspection frequency of an operator is related to the operator's 'risk profile' (which depends e.g. on the presence/absence of a validated self-checking system, results of previous inspections) as a result of which some degree of bias may be involved.			
Results:				
Year	Number of inspections	% of 'OK' or 'OK, subject to remarks'	Calculation of the indicator	Limit
2015	7475	97,95%	-12,51%	Not applicable
2014	1759	96,99%	39,05%	
2013	2433	95,89%	-50,00%	
2012	2648	97,20%	71,43%	
2011	3505	97,26%	0,00%	
Evolution: Over the last 5 years the number of inspections performed by the Agency with respect to infrastructure and hygiene in primary animal production more than doubled. Nevertheless, although there were some variations for this indicator in recent years, no real evolution could be observed (=status quo). In general, the level of conformity of this indicator is very high.				
Possible goal: 100% of the inspections have a favorable result.				
Additional information: The aim of these inspections is to check whether the animals are housed in an adequate and hygienic manner.				

⁴ <http://www.favv-afsc.fgov.be/checklists-nl/dierlijkesector.asp>

AHI04: Traceability inspections				
Description: The percentage of inspections regarding traceability that received a favourable evaluation or favourable with remarks.				
Category: Control of processes				
Part of the food chain: primary animal production sector				
Operators concerned: These inspections are conducted at primary production level (cattle farms, pig farms, sheep, goat and deer farms, layer hen farms, poultry farms, hatcheries), at traders and assembly centres, during transport (identification and registration of animals), at the semen collection and storage centres and at the embryo collection and production teams.				
Animal species: Bovines, sheep, goats, pigs, poultry, horses, deer.				
✓	Relevance of the indicator: Traceability is an important aspect of safeguarding animal health and is crucial for ensuring efficient crisis management. Inspections with regard to traceability are important means of evaluating whether operators have an efficient traceability system in place.			
✓	Accepted: This indicator indicates if operators meet the legal requirements with regard to traceability. The checklists on which the inspections are based, are available on the website of the Agency ⁵ enabling operators to evaluate if their business is in compliance with regulations.			
✓	Credible: The result of an inspection is determined on basis of a checklist, by which a fixed appraisal, under the form of a points score, will made for each item to be controlled, and in function of its relative importance. As for the results of any inspection, there are 3 possibilities: either favorable, favorable with remarks or unfavorable. The latter will result in further measures to be taken or in the drawing up of an official report.			
✓	Easy to monitor: data are collected by the FASFC			
✓	Robust: Changes to the evaluation system (e.g. new checklist or appraisal system) might occur and result in a year-to-year difference. Additionally it should be accounted for that the inspection frequency of an operator is related to the operator's 'risk profile' (which depends e.g. on the presence/absence of a validated self-checking system, results of previous inspections) as a result of which some degree of bias may be involved.			
Results:				
Year	Number of inspections	% of 'OK' or 'OK, subject to remarks'	Calculation of the indicator	Limit
2015	6202	84,38%	-1,55%	Not applicable
2014	6843	85,71%	-3,15%	
2013	6730	88,50%	-5,21%	
2012	5118	93,36%	-1,80%	
2011	5637	95,07%	0,19%	
Evolution: There is a decreasing trend of the indicator over the last 5 years. This is mainly due to less favorable results of the inspections regarding the identification and registration of sheep, goats and cervids. In Belgium the latter species are mainly held on hobby farms.				
Possible goal: 100% of the inspections have a favorable result.				
Additional information: Traceability means the ability to trace and monitor products through the various production, processing and distribution phases. More information regarding traceability can be found at: http://www.favv-afscab.be/autocontrole-nl/traceerbaarheid/ [Dutch] or http://www.favv-afscab.be/autocontrole-fr/tracabilite/ [French]				

⁵ <http://www.favv-afscab.be/checklists-nl/dierlijkesector.asp>

AHI05: Animal welfare inspections				
Description: The percentage of inspections regarding animal welfare that received a favourable evaluation or favourable with remarks. These inspections were conducted at agricultural holdings (including pig, calf and poultry farms), during the transport of slaughter animals to the slaughterhouse.				
Category: Control of processes				
Part of the food chain: primary animal production sector				
Operators concerned: These inspections were conducted at agricultural holdings (including pig, calf and poultry farms), during the transport of slaughter animals to the slaughterhouse.				
Animal species: Bovines, sheep, goats, calves, pigs, poultry, rabbits, horses, ratites, deer, farmed game				
<input checked="" type="checkbox"/>	Relevance of the indicator: Animal welfare is a basic condition for maintaining or improving animal health.			
<input checked="" type="checkbox"/>	Accepted: This indicator indicates if operators meet the legal requirements with regard to animal welfare. The checklists on which the inspections are based, are available on the website of the Agency ⁶ enabling operators to evaluate if their business is in compliance with regulations.			
<input checked="" type="checkbox"/>	Credible: The result of an inspection is determined based on a checklist, by which a fixed appraisal, under the form of a points score, will be made for each item to be controlled, and in function of its relative importance. As for the results of any inspection, there are 3 possibilities: either favorable, favorable with remarks or unfavorable. The latter will result in further measures to be taken or in the drawing up of an official report.			
<input checked="" type="checkbox"/>	Easy to monitor: data are collected by the FASFC			
<input checked="" type="checkbox"/>	Robust: Changes to the evaluation system (e.g. new checklist or appraisal system) might occur and result in a year-to-year difference. Additionally it should be accounted for that the inspection frequency of an operator is related to the operator's 'risk profile' (which depends e.g. on the presence/absence of a validated self-checking system, results of previous inspections) as a result of which some degree of bias may be involved.			
Results:				
Year	Number of inspections	% of 'OK' or 'OK, subject to remarks'	Calculation of the indicator	Limit
2015	/	/	/	Not applicable
2014	10886	97,36%	1,52%	
2013	11108	95,90%	-1,44%	
2012	9203	97,30%	-0,10%	
2011	9836	97,40%	0,25%	
Evolution: Although there were some variations for this indicator in recent years, no real evolution could be observed (=status quo). In general, the level of conformity of this indicator is very high.				
Possible goal: 100% of the inspections have a favorable result.				
Additional information: This indicator had to be removed from the basket of indicators from 2015 on. Although this indicator is still relevant, it cannot be calculated anymore because the inspection of animal welfare has recently become a part of the competences of the regions and the former scoring system of the FASFC is no longer applied.				

⁶ <http://www.favv-afsc.fgov.be/checklists-nl/dierlijkesector.asp>

AHI06: Notification of bovine abortions				
Description: The percentage of ruminant (cattle, sheep, goats) abortions examined annually in relation to the total number of adult females (bovine animals above 24 months of age; sheep and goats above 6 months of age)				
Category: Preventive measures				
Part of the food chain: primary animal production sector				
Operators concerned: Cattle farmers, sheep farmers, goat farmers				
Animal species: Bovines, sheep, goats				
✓	Relevance of the indicator: Ruminant abortions may be a result of various diseases such as brucellosis, neosporosis, BVD (Bovine Viral Diarrhoea), Q fever,... The examination of these abortions constitute an important element in the surveillance of animal health.			
✓	Accepted: Farmers are legally obliged to notify every abortions to the government. However, in the past there was a significant underreporting due to various reasons. Therefore, the FASFC has installed the 'abortion protocol' which encourages farmers to notify abortions and provide abortive tissues for laboratory analysis (with-out supplementary costs). As a result of this, the number of declared abortions have increased significantly.			
✓	Credible: During the period 2011-2015, there were no field indications that there was an actual rise in the number of abortions. Therefore, an increase of the number of reported abortions was considered in this context as an indication of a substantial degree of vigilance with regard to the safeguarding of animal health and is therefore interpreted as a favorable element.			
✓	Easy to monitor: data are collected by regional laboratories DGZ and ARSIA under the authority of the FASFC			
✓	Robust			
Results:				
Year	Number of adult females	% abortions	Calculation of the indicator	Limit
2015	1626022	0,74%	+10,45%	Not applicable
2014	1591666	0,67%	+9,84%	
2013	1569604	0,61%	-17,57%%	
2012	1592057	0,74%	+42,31%	
2011	1618187	0,52%	/	
Evolution: The indicator on notifications of ruminant abortions shows a positive trend over the last 5 years. This is mainly due to the installation of the 'abortion protocol' by the government which encourages farmers to notify abortions and provide abortive tissues for laboratory analysis (with-out supplementary costs).				
Possible goal: It is estimated that the percentage of ruminants with a notified abortion is low because of several reasons. First of all, Belgium is officially free from brucellosis and abortion storms in ruminants have not occurred lately. Secondly, abortion is often not detected by the farmer especially in the earlier stages of gestation. Indeed, according to Forar et al. (1995) only 20 to 30% of abortions are detected visually. Thirdly, Belgium has an important beef cattle production and abortion may stay undetected in pregnant beef cattle on pasture. Fourth, it has been described that various, often socio-economical reasons play a role in the underreporting of abortion by farmers (Bronner et al., 2014). Finally, farmers are traditionally of the opinion that they only have to notify abortion in case of observation of the expulsion of a dead or non-viable foetus during mid- and end-gestation. Therefore, taking all these factors into consideration, it is postulated that the percentage of cattle with a notified abortion is not likely to be higher than 1% in Belgium, which is in line with the study of Norman et al. (2012). The goal for this indicator is therefore set on <u>1%</u> of ruminant pregnancies.				
Additional information:				

Once an abortion has been reported, an analysis of the mother's serum is carried out, as well as an analysis of the abortive tissues. These analyses are aimed at detecting brucellosis, leucosis, leptospirosis, Q fever, neosporosis, IBR (Infectious Bovine Rhinotracheitis), bluetongue, BVD (Bovine Viral Diarrhoea), Schmallenberg virus, *Listeria monocytogenes*, *Aspergillus fumigatus*, *Salmonella* spp., ... There are other causes for abortion, such as metabolic disruption and genetic abnormalities that cannot be verified through these examinations.

An increase of this indicator, i.e. the percentage of pathological examinations performed on aborted tissues, indicates greater awareness of the sector regarding abortion. An increase of the indicator is interpreted as a favourable development of the surveillance of ruminant health.

AHI07: Bulk tank somatic cell count				
Description: The percentage of tank milk samples for which the number of cells is below or equal to 400.000/ml annually.				
Category: Control of animal products				
Part of the food chain: primary animal production sector				
Operators concerned: Dairy cattle farms				
Animal species: Bovines				
✔	Relevance of the indicator: A number of cells above 400.000/ml in milk is a clear indication of mastitis. Mastitis, or inflammation of the udder is an infection of the udder's glandular tissue. This constitutes one of the main economic diseases in bovines. Good udder health is essential for ensuring optimum milk production. As part of the reduction of antibiotic use in animal production, it is equally important to work towards a good udder health of dairy cows.			
✔	Accepted: Farmers are legally obliged to take milk samples on which a certain set of analyses is performed at fixed intervals. One of these analyses of the somatic cell count. If farmers do not meet the legal requirements they get a reduced price for their milk.			
✔	Credible: An increase in the number of somatic cells (number of cells) in the milk is an important characteristic of an inflammatory reaction in the udder. Therefore, this indicator provides good information about the udder health on a dairy farm.			
✔	Easy to monitor: The data used for this indicator originates from Melkcontrolecentrum (MCC) (Flanders) and from Comité du lait (Wallon).			
✔	Robust			
Results:				
Year	Number of samples	% conformity	Calculation of the indicator	Limit
2015	407533	91,44%	+0,14%	Not applicable
2014	422098	91,31%	+0,18%	
2013	416850	91,15%	+1,79%	
2012	427459	89,55%	-0,56%	
2011	445856	90,05%	+1,44%	
Evolution: This indicator shows a positive trend over the last 5 years. In general, the level of conformity of this indicator is high.				
Possible goal: 100% of the milk samples have a number of somatic cells is that below or equal to 400.000/ml.				
Additional information:				
<p>Mastitis or inflammation of the udder is an inflammation of the mammary gland caused by pathogenic microorganisms. There are two main forms of mastitis, clinical mastitis and subclinical mastitis. In the case of clinical mastitis, the udder is very inflamed. It can be recognised by abnormal milk (formation of flakes in the milk) and/or by a hard, warm or painful quarter. Subclinical means that there are no real clinical symptoms such as those mentioned above, but that the quality of the milk changes and production is reduced.</p> <p>An increase in the number of somatic cells (number of cells) in the milk is an important characteristic of this inflammatory reaction. When the number of cells reaches 250.000/ml, farmers are advised to take measures, since this is a clear sign that a significant proportion of the cows are infected with mammopathogenic bacteria. When the geometric mean of the results over the last 3 months repeatedly exceeds 400.000/ml, penalty points and a lower milk price are imposed on the farmer. In dairy cows, mastitis is a rather common disease, which has a considerable economic impact.</p>				

AHI08: Pig carcasses declared non-compliant				
Description: The annual percentage of pig carcasses declared non-compliant in relation to the number of pigs slaughtered in Belgium.				
Category: Control of animal products				
Part of the food chain: primary animal production sector				
Operators concerned: Pig farms				
Animal species: Pigs				
<input checked="" type="checkbox"/>	Relevance of the indicator: The rejection of slaughter animals for health reasons constitutes a direct measurement of animal health.			
<input checked="" type="checkbox"/>	Accepted: A veterinary inspection at slaughter is legally obliged for every slaughtered pig in Belgium. This inspection constitutes a visual inspection and palpation of the carcass and organs. If a pathologic lesions is detected, additional incisions are made.			
<input checked="" type="checkbox"/>	Credible: Every pig that is slaughtered in Belgium has to undergo a veterinary inspection at slaughter before entering the food chain. Therefore, this indicator gives valuable information about pig health in Belgium.			
<input checked="" type="checkbox"/>	Easy to monitor: data are collected by the FASFC			
<input checked="" type="checkbox"/>	Robust			
Results:				
Year	Number of pigs slaughtered	% carcasses declared compliant	Calculation of the indicator	Limit
2015	11918906	0,19%	0,00%	Not applicable
2014	11888367	0,19%	-11,76%	
2013	11945237	0,17%	-6,25%	
2012	11724413	0,16%	0,00%	
2011	11800995	0,16%	/	
Evolution: This indicator shows a negative trend over the last 5 years.				
Possible goal: 100% of the pig carcasses are declared compliant.				
Additional information: A veterinary inspections of pig carcasses is carried out during the slaughtering process. A carcass may be rejected on animal health grounds but also on the grounds of certain quality requirements or because the animal was already dead prior to commencing the slaughtering process.				

AHI09: Antimicrobial resistance in <i>E. coli</i> indicator bacteria				
Description: The annual percentage of <i>E. coli</i> isolates from live animal sources, collected by the FASFC within the framework of the monitoring of indicator bacteria, which are sensitive to all of the antimicrobials tested.				
Category: Control of animal products				
Part of the food chain: primary animal production sector				
Operators concerned: Pig farms, broiler farms, cattle farms and veal farms				
Animal species: calves (<7 months), pigs and broilers				
✓	Relevance of the indicator: The presence of a resistance to antibiotics in the indicator bacteria constitutes a measurement of the use of antibiotics in the primary production and the general health status of animals.			
✓	Accepted: a Center of expertise on Antimicrobial Consumption and Resistance in Animals (AMCRA) has recently been founded in Belgium, and is financed and supported by various stakeholders and government institutions. The main mission of AMCRA is to collect and analyze all data related to antimicrobial use and resistance in animals in Belgium and to propose guidelines to direct the whole animal industry towards a rational reduction of antimicrobial use.			
✓	Credible: The percentage of <i>E. Coli</i> isolates that remain sensitive to all types of tested antibiotics constitute a measurement of the occurrence of antibiotic resistance and consequently the use of antibiotics. An increase of this indicator, i.e. an increase in the percentage of <i>E. coli</i> isolates sensitive to all types of antibiotics tested, constitute a sign of the reduction of antibiotic resistance and indirectly an improvement of animal health given that there is a reduced need to treat animals.			
✓	Easy to monitor: data are collected by the FASFC			
✓	Robust			
Results:				
Year	Number of <i>E. coli</i> isolates	% sensitive isolates	Calculation of the indicator	Limit
2015	714	37,56%	+9,99%	Not applicable
2014	694	34,15%	+34,34%	
2013	838	25,42%	+33,37%	
2012	855	19,06%	-8,89%	
2011	765	20,92%	/	
Evolution: This indicator shows a clear positive trend over the last 5 years.				
Possible goal: 100% of <i>E. coli</i> bacteria are sensitive to antimicrobials.				
Additional information: Antibiotics are given to animals for therapeutic and disease prevention purposes. The use of antimicrobials has caused selective pressure, which has thus made resistance a considerable problem in terms of animal health. Antimicrobial treatment induces a selective pressure by inhibiting the growth of sensitive germs and thereby permitting a better growth of resistant bacteria.				

AHI10: Mortality of slaughter pigs				
Description: The annual percentage of slaughter pigs that have died and been disposed of at a rendering plant relative to the number of pigs slaughtered.				
Category: Animal health				
Part of the food chain: primary animal production sector				
Operators concerned: Pig farms				
Animal species: Pigs				
✓	Relevance of the indicator: The death of animals constitutes a direct measurement of animal health.			
✓	Accepted: There is a legal obligation to transport deceased animals to a destruction plant where the corpses are then processed.			
✓	Credible: This indicator serves as a criterion for the mortality of slaughter pigs. A reduction of this indicator reflects an improvement in animal health.			
✓	Easy to monitor: data are collected by the rendering plant (RENDAC)			
✓	Robust			
Results:				
Year	Number of pigs slaughtered	% mortality	Calculation of the indicator	Limit
2015	11507150	3,14%	+5,72%	Not applicable
2014	11391630	2,97%	+3,13%	
2013	11618595	2,88%	-10,28%	
2012	11479674	3,21%	-14,17%	
2011	11579365	3,74%	+10,00%	
Evolution: No real evolution could be observed (=status quo) over the last 5 years.				
Possible goal: Since there is no data available about what is a 'normal' mortality rate in pigs, the objective for this indicator is set at 10% lower than the minimum mortality rate that is recorded over the years (currently 2,59%)				
Additional information: This indicator doesn't cover mass mortality resulting from an incident (for example fire or ventilation failure). The sanitation that forms part of the official combat and prevention of animal diseases is neither taken into account in this indicator.				

AHI11: Mortality of small ruminants				
Description: The annual percentage of adult small ruminants (sheep and goats of more than 6 months of age) that have died and been disposed of at a rendering plant.				
Category: Animal health				
Part of the food chain: primary animal production sector				
Operators concerned: Sheep and goat farms				
Animal species: Sheep and goats				
✔	Relevance of the indicator: The death of animals constitutes a direct measurement of animal health.			
✔	Accepted: There is a legal obligation to transport deceased animals to a destruction plant where the corpses are then processed.			
✔	Credible: This indicator serves as a criterion for the mortality of small ruminants. A reduction of this indicator reflects an improvement in animal health.			
✔	Easy to monitor: data are collected by the rendering plant (RENDAC)			
✔	Robust			
Results:				
Year	Number of small ruminants	% mortality	Calculation of the indicator	Limit
2015	312352	10,36%	-2,81%	Not applicable
2014	293404	10,66%	-7,79%	
2013	281554	11,56%	+7,64%	
2012	279130	10,74%	+4,47%	
2011	277078	10,28%	-8,78%	
Evolution: No real evolution could be observed (=status quo) over the last 5 years. Nevertheless, mortality in small ruminants seems to be high compared to other species.				
Possible goal: Since there is no data available about what is a 'normal' mortality rate in small ruminants, the objective for this indicator is set at 10% lower than the minimum mortality rate that is recorded over the years (currently 9,25%).				
Additional information: This indicator doesn't cover mass mortality resulting from an incident (for example fire or ventilation failure). The sanitation that forms part of the official combat and prevention of animal diseases is neither taken into account in this indicator.				

AHI12: Poultry carcasses declared non-compliant				
Description: The annual percentage of poultry carcasses declared non-compliant in relation to the number of poultry slaughtered in Belgium.				
Category: Control of animal products				
Part of the food chain: primary animal production sector				
Operators concerned: Poultry farms				
Animal species: Poultry				
✓	Relevance of the indicator: The rejection of slaughter animals for health reasons constitutes a direct measurement of animal health.			
✓	Accepted: A veterinary inspection at slaughter is legally obliged for every slaughtered chicken in Belgium. This inspection constitutes a visual inspection and palpation of the carcass and organs. If a pathologic lesions is detected, additional incisions are made.			
✓	Credible: Every chicken that is slaughtered in Belgium has to undergo a veterinary inspection at slaughter before entering the food chain. Therefore, this indicator gives valuable information about poultry health in Belgium.			
✓	Easy to monitor: data are collected by the FASFC			
✓	Robust			
Results:				
Year	Number of slaughtered poultry	% declared non-compliant	Calculation of the indicator	Limit
2015	307538818	0,63%	+6,78%	Not applicable
2014	297881136	0,59%	-9,23%	
2013	294853925	0,65%	-16,67%	
2012	313096763	0,78%	-1,27%	
2011	308809657	0,79%	-3,66%	
Evolution: This indicator shows a negative trend over the last 5 years.				
Possible goal: 100% of the poultry carcasses are declared compliant.				
Additional information: A veterinary inspections of the poultry carcasses is carried out during the slaughtering process. A carcass may be rejected on animal health grounds but also on the grounds of certain quality requirements or because the animal was already dead prior to commencing the slaughtering process.				

AHI13: Mortality of veal calves				
Description: The annual percentage of veal calves that have died and been disposed of at a rendering plant relative to the number of veal calves that have been set up at veal farms				
Category: Animal health				
Part of the food chain: primary animal production sector				
Operators concerned: Veal farms				
Animal species: cattle				
✓	Relevance of the indicator: The death of animals constitutes a direct measurement of animal health.			
✓	Accepted: There is a legal obligation to transport deceased animals to a destruction plant where the corpses are then processed.			
✓	Credible: This indicator serves as a criterion for the mortality of veal calves. A reduction of this indicator reflects an improvement in animal health.			
✓	Easy to monitor: data are collected by the rendering plant (RENDAC)			
✓	Robust			
Results:				
Year	Number of veal calves	% mortality	Calculation of the indicator	Limit
2015	318919	3,84%	-13,12%	Not applicable
2014	313966	4,42%	-4,74%	
2013	309678	4,64%	-15,02%	
2012	303356	5,46%	+2,06%	
2011	326519	5,35%	+3,08%	
Evolution: There is a clear decrease in mortality amongst veal calves over the last 5 years. This is probably due to the ongoing eradication campaigns against the BVD and IBR viruses.				
Possible goal: Since there is no data available about what is a 'normal' mortality rate in veal calves, the objective for this indicator is set at 10% lower than the minimum mortality rate that is recorded over the years (currently 3,77%).				
Additional information:				
This indicator doesn't cover mass mortality resulting from an incident (for example fire or ventilation failure). The sanitation that forms part of the official combat and prevention of animal diseases is neither taken into account in this indicator.				
Veal farms represent a separate and highly specialised branch of the Belgian cattle industry characterised by few but large holdings (Pardon et al., 2012). The main causes of death in veal calves are respiratory disorders and digestive problems.				

AHI14: Relative number of outbreaks of notifiable animal diseases				
Description: The number of outbreaks of the various mandatory notifiable animal diseases (currently 70) that occur in Belgium annually relative to the number of farms for every susceptible species.				
Category: Preventive measures				
Part of the food chain: primary animal production sector				
Animal species: Bovines, sheep, goats, pigs, poultry, horses, lagomorphs, ratites, deer, fish, bees, molluscs, crustaceans, minks				
✓	Relevance of the indicator: Mandatory notifiable disease are infectious diseases that cause socio-economic damage or that have a significant impact on public health, and which are of significance to the international trade of animals and animal products. The relative number of mandatory notifiable animal diseases reported each year is therefore an important indicator for animal health.			
✓	Accepted: Given the tremendous impact of these diseases on animal health at farm level and at country level, farmers and veterinarians are likely to report a (possible) outbreak. Furthermore, there is a legal obligation to report these diseases.			
✓	Credible: The reporting of a mandatory notifiable disease 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 greater degree of vigilance with regard to the hazards and risks.			
✓	Easy to monitor: data are collected by the FASFC			
✓	Robust			
Results:				
Year	Number of farms with an outbreak of a notifiable animal disease	Relative number of outbreaks (to the number of farms for every species)	Calculation of the indicator	Limit
2015	25	0,0174%	65,27%	Not applicable
2014	72	0,0501%	-170,81%	
2013	27	0,0185%	23,87%	
2012	36	0,0243%	-53,80%	
2011	24	0,0158%	/	
Evolution: Although there were some strong variations for this indicator in recent years, no real evolution could be observed (=status quo).				
Possible goal: It should be the objective that no mandatory notifiable animal disease is present in Belgium (=0%).				
Additional information:				
<p>“Mandatory notifiable” means that suspected contamination must be reported immediately by the livestock holder or the veterinarian at the Provincial Control Unit of the FASFC. Once contamination has been confirmed through laboratory examinations, the outbreak must be reported by the authorities within 24 hours to the World Organisation for Animal Health (OIE) and to the European Union (EU). The OIE and the EU then disseminate information to other countries. The measures implemented to combat these diseases are aimed at eradicating or controlling a given disease.</p> <p>The list with mandatory notifiable animal diseases contained 73 diseases until 2013. After an adaption of the law in 2014, the list currently contains 70 diseases. This list can be found at http://www.favv.be/dierengezondheid/zoosanitaire-belgie/</p> <p>A notification of a mandatory notifiable animal disease is considered as a deterioration of animal health.</p>				

AHI15: Antimicrobial consumption in animal production				
Description: The annual consumption of antimicrobials (in kg active ingredient) relative to the total biomass of productions animals in Belgium				
Category: Animal health				
Part of the food chain: primary animal production sector				
✓	<p>Relevance of the indicator: Obviously, the use of antimicrobials is closely linked with animal health because antimicrobials are mostly used to treat sick animals (although prophylactic and metaphylactic use occurs also in industrials farm conditions). Moreover, there is increasing evidence and concern that antimicrobial usage in animal productions induces antimicrobials resistance which may spill over to humans (via food and environment).</p>			
✓	<p>Accepted: a Center of expertise on Antimicrobial Consumption and Resistance in Animals (AMCRA) has recently been founded in Belgium, and is financed and supported by various stakeholders and government institutions. The main mission of AMCRA is to collect and analyze all data related to antimicrobial use and resistance in animals in Belgium and to propose guidelines to direct the whole animal industry towards a rational reduction of antimicrobial use.</p>			
✓	<p>Credible: Because the number of animals in Belgium may vary over time, the total consumption of antimicrobials is divided by the total biomass of (production) animals in Belgium. In that way the results are comparable between different years.</p>			
✓	<p>Easy to monitor: data are collected by the 'Belgian Veterinary Surveillance of Antibacterial Consumption' knowledge center and can be consulted online (see below)</p>			
✓	<p>Robust</p>			
Results:				
Year	Total consumption of antimicrobials (in kg active ingredient)	Total mg of active substance used per kg biomass	Calculation of the indicator	Limit
2015	2,60*10 ¹¹	123,4	4,65%	Not applicable
2014	2,68*10 ¹¹	129,42	-1,09%	
2013	2,59*10 ¹¹	128,02	6,22%	
2012	2,78*10 ¹¹	136,51	6,94%	
2011	2,99*10 ¹¹	146,69	/	
<p>Evolution: Although there was a small increase in antimicrobial consumption in 2014, the general trend shows a decrease in antimicrobial consumption and therefore an amelioration of this indicator.</p>				
<p>Possible goal: In analogy with the AMCRA 2020 objectives (see http://amcra.be/en/about-amcra) the goal is to reduce the antimicrobial consumption of the reference year 2011 with 50%.</p>				
<p>Additional information: The data for this indicator are gathered by the 'Belgian Veterinary Surveillance of Antibacterial Consumption' knowledge center and their annual report can be consulted online: http://www.belvetsac.ugent.be/pages/home/ The data for antimicrobial consumption (in kg active ingredient) include data for farm animals as well as companion animals. The denominator for animal production is the biomass (in kg) calculated as the sum of the amount of beef, pork and poultry meat produced in 2014, plus the number of dairy cattle present in Belgium times their metabolic weight per head.</p>				

Appendix 4: RACER criteria applied to the plant health indicators.

Based on MANCP (2015).

Relevant	<p>Is the indicator used closely linked to the objective to be reached, namely representing the state?</p> <p><input type="checkbox"/> <i>The whole of the indicators must be representative for the entire chain considered.</i></p> <p><input type="checkbox"/> <i>Linked to the objectives (e.g. strategic, operational, policy or any other standards).</i></p>
Accepted	<p>Is the indicator accepted by all stakeholders?</p> <p><input type="checkbox"/> <i>The set of indicators should be understood and agreed by the stakeholders involved.</i></p>
Credible	<p>Is the indicator credible?</p> <p><input type="checkbox"/> <i>Unambiguous, easy to interpret and transparent.</i></p> <p><input type="checkbox"/> <i>The indicator consistently produces the same result, based on reliable data.</i></p> <p><input type="checkbox"/> <i>Unambiguous relationship between an increase or decrease of the indicator on the one hand, and an improvement of the overall state on the other hand.</i></p>
Easy to monitor	<p>Is the indicator easy to monitor?</p> <p><input type="checkbox"/> <i>Based on easily obtainable, high-quality and unbiased data, providing a user friendly management tool.</i></p> <p><input type="checkbox"/> <i>Measurable on a quantitative data basis and capable of rendering evolutionary trends over certain periods of time.</i></p> <p><input type="checkbox"/> <i>Indicators that are difficult to monitor should be avoided where possible.</i></p>
Robust	<p>Will the indicator continue to be usable and not subject to misunderstandings / manipulation?</p> <p><input type="checkbox"/> <i>Robust indicator is capable of performing under a wide range of conditions, i.e. is not sensitive to changes in the broader environment of the data/indicators.</i></p> <p><input type="checkbox"/> <i>Specific indicator is affected by the underlying processes to be measured, but not affected by other processes.</i></p> <p><input type="checkbox"/> <i>Sensitive indicator follows closely any changes in the underlying process to be measured.</i></p> <p><input type="checkbox"/> <i>Unambiguous indicator is not open to more than one interpretation.</i></p> <p><input type="checkbox"/> <i>The indicator has already been measured over a long period of time, and is expected to be further followed up during many years to come.</i></p>

Appendix 5: Response on the remarks formulated at the occasion of the open consultation of 15/09/2017