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Supplementary Materials

OVALI, Sustainability for Poultry®: A Method Co-designed by Stakeholders to Assess the Sustainability of Chicken Supply Chains in their Territories

Supplementary File S1: Detailed Description of the Indicators of the OVALI Method

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List of the Indicators of the OVALI Method

Economic Pillar

ECO.I1–Production Cost (At Slaughterhouse Exit Gate)

(17 points; 2 sub-indicators)

Table ECO.I1 Description of the sub-indicators[1] considered for the calculation of ECO.I1 indicator.

Sub-indicator	Unit	Scale or SC Links Concerned	Method(s)	Origin of Data
Live weight production cost at farm gate (10 points)	€ / tonne live weight	chicken farms	ITAVI production cost model	operators, ITAVI expertise
Production cost in slaughterhouse (7 points)	€ /tonne carcass	slaughtering	ITAVI production cost model	operators, ITAVI expertise

[1] The scores of the sub-indicators are added to provide a single score for ECO.I1 indicator.

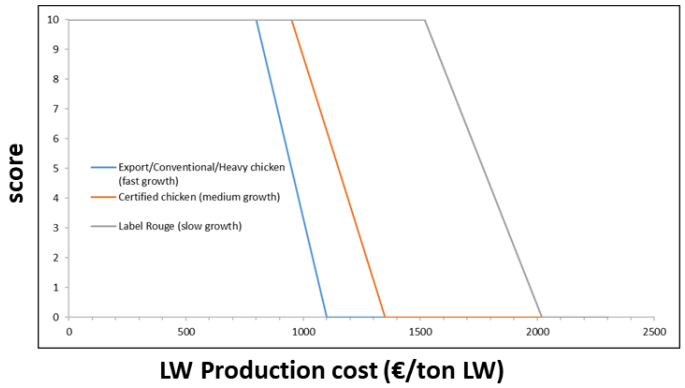


Figure ECO.I1a Conversion scale for sub-indicator "Live weight production cost at farm gate".

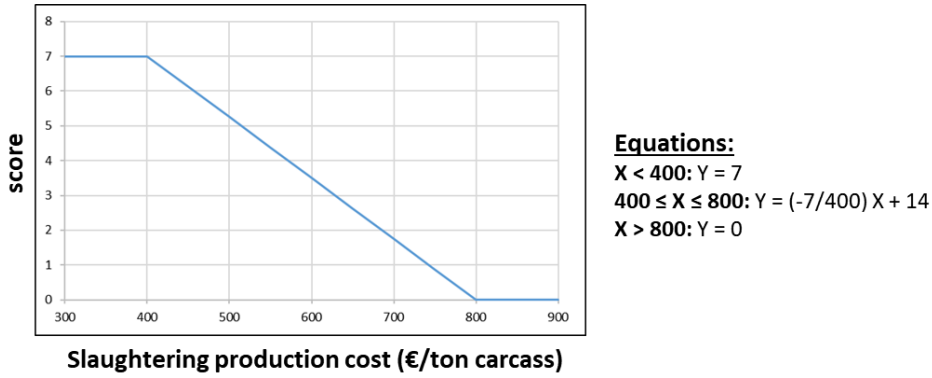


Figure 1. b Conversion scale for sub-indicator "Production cost in slaughterhouse".

Conversion scales were fit using reference production costs measured in France and in other countries (Brazil) by ITAVI and High Council for Food, Agriculture and Rural Areas (French Ministry of Agriculture). The same function is used for slaughtering of all chicken productions, but different functions are used for different chicken production.

ECO.I2–Non-Price Competitiveness of the Product

(10 points; 5 sub-indicators)

Table ECO.I2a Description of the sub-indicators[1] considered for the calculation of ECO.I2 indicator.

Sub-indicator	Unit	Scale or SC Links Concerned	Method (s)	Origin of Data
Value of constraints and over costs due to the product specifications (2 points)	ordinal scale	whole SC (except chicken farms, production organizations, retailing)	survey [2]	operators
Services and logistics (2 points)	ordinal scale	retailing	survey [2,3]	operators
Operators' reactivity (2 points)	ordinal scale	retailing	survey [2,3]	operators
Product quality (2 points)	ordinal scale	retailing	survey [2,3]	operators
Product diversification (2 points)	ordinal scale	retailing	survey [2,3]	operators

[1] The scores of the sub-indicators are added to provide a single score for ECO.I2 indicator.

[2] When several operators are surveyed, an average score for each SC link is calculated, and used to calculate a global average score.

[3] For each survey, scores of the four sub-indicators are added before the calculation of average scores for each SC link. From these average scores, a global average score is calculated and added to the score of the first sub-indicator to provide the final score of ECO.I2 indicator.

Table ECO.I2b Description of the conversion scales for the sub-indicators considered for the calculation of ECO.I2 indicator.

Value of Constraints and Over Costs due to the Product Specifications		Services and Logistics		Operators' Reactivity		Product Quality		Product Diversification	
Answer	**Points**	**Answer**	**Points**	**Answer**	**Points**	**Answer**	**Points**	**Answer**	**Points**
High	2	*Good*	2	*Fast*	2	*Good*	2	*Correct*	2
Quite good	1.5	*Quite good*	1.5	*Quite fast*	1.5	*Quite good*	1.5	*Too / not enough diversified*	0
Quite low	1	*Quite bad*	0	*Quite slow*	1	*Quite bad*	1		
None	0	*Bad*		*Slow*	0	*Bad*	0		

ECO.I3–Net Margin of Supply Chain Operators

(13 points; 3 sub-indicators)

Table ECO.I3a Description of the sub-indicators[1] considered for the calculation of ECO.I3 indicator.

Sub-indicator	Unit	Scale or SC Links Concerned	Method (s)	Origin of Data
Net margin of operators (5 points)	% of revenues	hatchery, feed production, slaughtering, food processing [2, 3]	survey	operators
Good repartition of net margin in the SC (2 points)	yes / no	hatchery, feed production, slaughtering, food processing [2, 3]	survey	operators
Available income for farmers (6 points)	€ / man work unit / year	chicken farms, production organizations [4]	survey	farmers

[1] The scores of the sub-indicators are added to provide a single score for ECO.I3 indicator.

[2] A global score for this indicator is calculated as the sum of the average score of each SC link multiplied by their respective weighting coefficient. Weighting coefficients were chosen in function of the difficulty to reach the objectives of net margin: *20 % for hatchery; 30 % for feed production; 50 % for slaughtering and food processing.*

[3] Production organizations were not surveyed as they don't have an objective of net margin, and are generally associated to a feed producer or a slaughterhouse. Genetic selection and retailers were not surveyed as we considered that their activity would be the same independently from the sustainability of the chicken SC.

[4] An average score is calculated from the answers of the different surveyed operators.

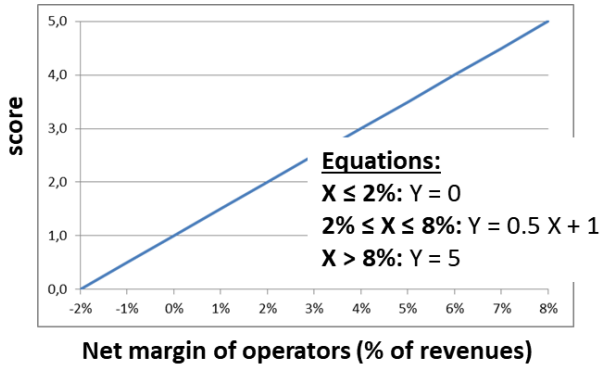


Figure ECO.I3a Conversion scale for sub-indicator "Net margin of operators ".

Table ECO.I3b Conversion scale for sub-indicator "Good repartition of net margin in the SC".

Answer	Points
Yes	2
No	0

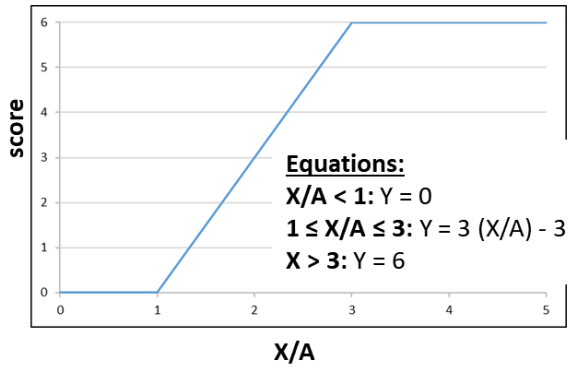


Figure ECO.I3b Conversion scale for sub-indicator "Net margin of operators". *X*: net margin of farmers (€/year); A: annual minimum wage (€/year).

ECO.I4–Added Value of Supply Chain Operators

(13 points; 2 sub-indicators)

Table ECO.I4a Description of the two sub-indicators[1] considered for the calculation of ECO.I4 indicator.

Sub-indicator	Unit	Scale or SC Links Concerned	Method (s)	Origin of Data
Added value produced for each SC operator (11 points)	% of revenues	hatchery, feed production, slaughtering, food processing 2,3	survey	operators
Good repartition of added value in the SC (2 points)	€ / man work unit / year	hatchery, feed production, slaughtering, food processing 2,3	survey	operators

[1] The scores of the sub-indicators are added to provide a single score for ECO.I4 indicator.

[2] Production organizations were not surveyed as they don't have an objective of net margin, and are generally associated to a feed producer or a slaughterhouse. Genetic selection and retailers were not surveyed as we considered that their activity would be the same independently from the sustainability of the chicken SC.

[3] A global score for this indicator is calculated as the sum of the average score of each SC link multiplied by their respective weighting coefficient. Weighting coefficients were chosen in function of the difficulty to reach the objectives of net margin:
20 % for hatchery; 30 % for feed production; 50 % for slaughtering and food processing.

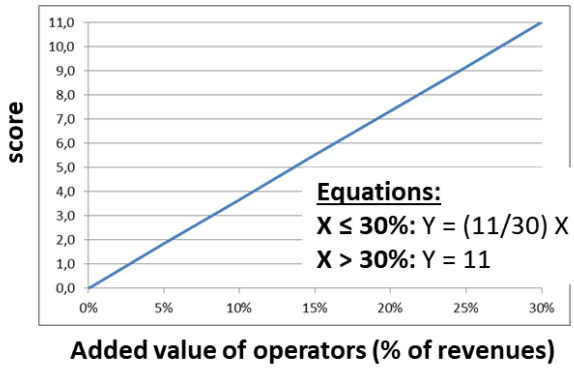


Figure ECO.I4 Conversion scale for sub-indicator "Added value produced for each SC operator Net margin of operators ".

Table ECO.I4b Conversion scale for sub-indicator "Good repartition of added value in the SC".

Answer	Points
Yes	2
No	0

ECO.I5–Number of Jobs in the Supply Chain within the Territory

(10 points; 4 sub-indicators)

Table ECO.I5. Description of the sub-indicators[1] considered for the calculation of ECO.I5 indicator.

Sub-indicator	Unit	Scale or SC Links Concerned	Method (s)	Origin of Data
Number of jobs (except in farms) (3 points)	number	whole SC (except chicken farms)	data-base	agriculture chambers
Evolution of the number of jobs (except in farms) (2 points)	%	whole SC (except chicken farms)	data-base	agriculture chambers
Number of jobs in farms (3 points)	number	chicken farms	data-base	agriculture chambers
Evolution of the number of jobs in farms (2 points)	%	chicken farms	data-base	agriculture chambers

[1] The scores of the sub-indicators are added to provide a single score for tECO.I5 indicator.

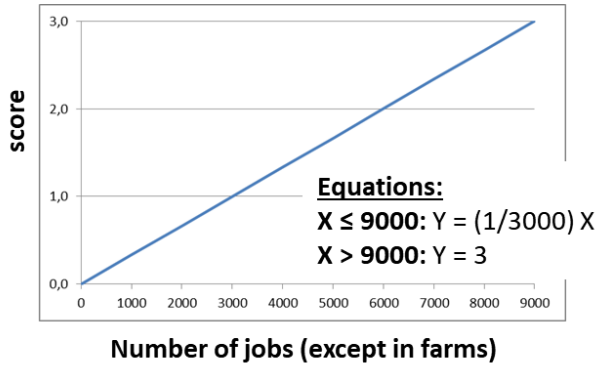


Figure ECO.I5a Conversion scale for sub-indicator "Number of jobs (except in farms) "

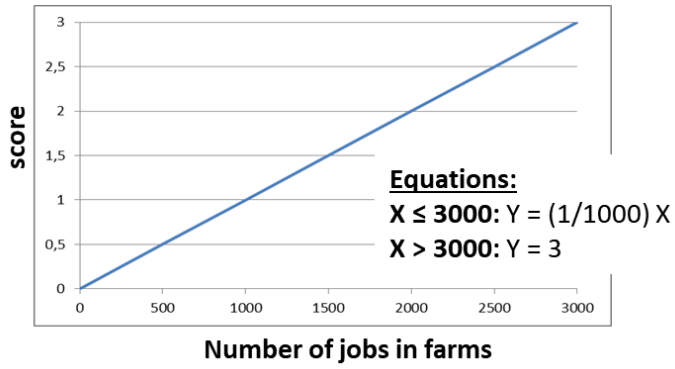


Figure ECO.I5b Conversion scale for sub-indicator "Number of jobs in farms"

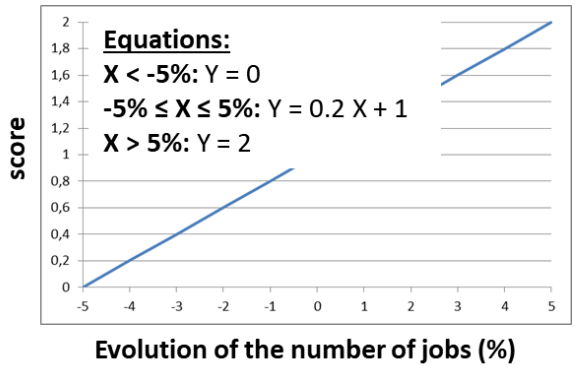


Figure ECO.I5c Conversion scale for sub-indicators "Evolution of the number of jobs (except in farms) "and "Evolution of the number of jobs in farms".

ECO.I6–Percentage of Added Value Created in France.

(10 points; 1 indicator)

Table ECO.I6 Description of ECO.I6 indicator.

Indicator	Unit	Scale or SC Links Concerned	Method(s)	Origin of Data
Share of the total added value produced in France (10 points)	%	hatchery, feed production, slaughtering, food processing	survey, database	operators, ITAVI

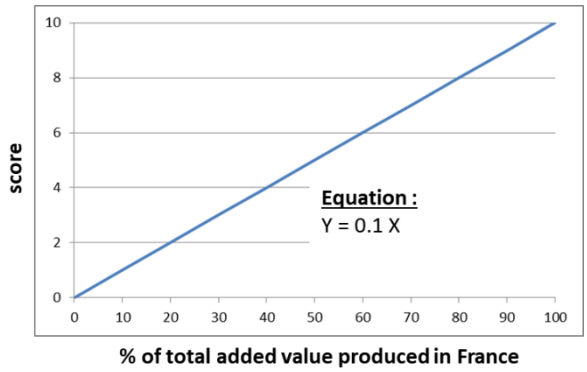


Figure ECO.I6 Conversion scale for ECO.I6 indicator.

ECO.I7–Price Competitiveness of the Product Compared to Competing Products

(16 points; 1 indicator)

Table ECO.I7 Description of the ECO.I7 indicator.

Indicator	Unit	Scale or SC Links Concerned	Method(s)	Origin of Data
Difference of price between the product and other meat products in competition (in consumer's mind) (16 points)	base 100	retailing	Database, survey [1,2]	KANTAR, Worldpanel, 2012 www.macdonalds.fr www.redyme.com

[1] An average score is calculated from the answers of the different surveyed operators.

[2] When several products are produced in the SC, a weighted score is calculated using the % of each product in national production.

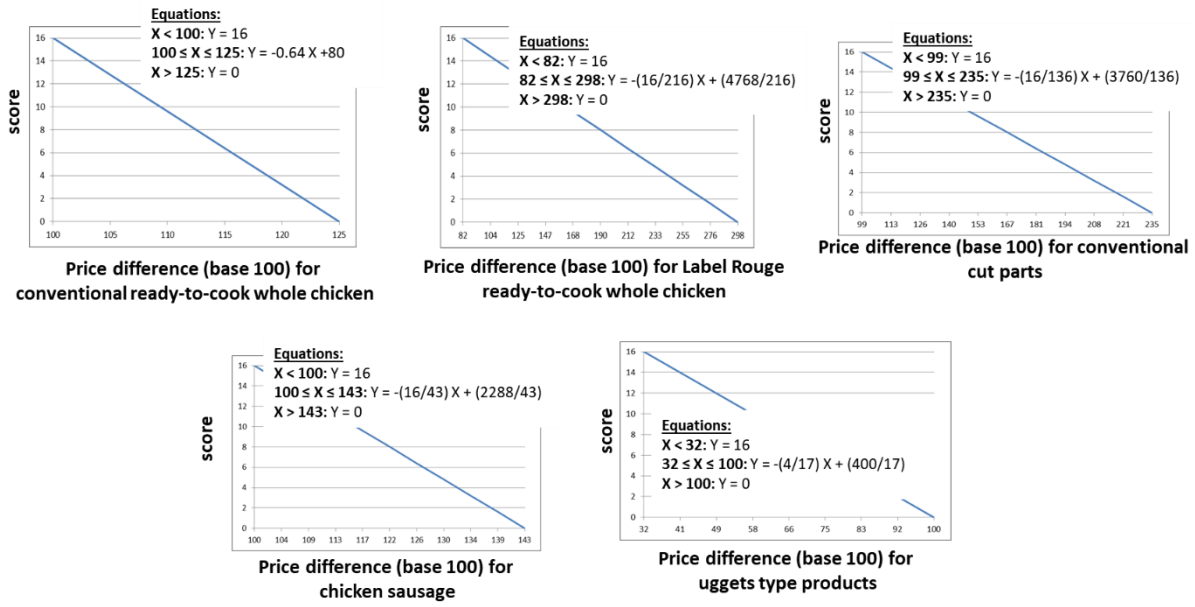


Figure ECO.I7 Conversion scales for ECO.I7 indicator.

ECO.I8–Organoleptic Quality of the Product (Taste, Visual Appearance)

(10 points; 4 sub-indicators)

Table ECO.I8a Description of the sub-indicators[1] considered for the calculation of ECO.I8 indicator.

Sub-indicator	Unit	Scale or SC Links Concerned	Method(s)	Origin of Data
Whole chicken visual aspect (3 points)	ordinal scale	slaughtering, food processing, retailing	survey	operators
Cut parts or processed products visual aspect (3 points)	ordinal scale	slaughtering, food processing, retailing	survey	operators
Modified atmosphere packaging (2 points)	ordinal scale	slaughtering, food processing, retailing	survey	operators
Taste (2 points)	ordinal scale	slaughtering, food processing, retailing	literature	Humber F, Delannoy J, 2011. Que choisir, n°497. Guibert F, Victoria R, 2004. 60 million de consommateurs, n°380

[1] For each survey, scores of the four sub-indicators are added before the calculation of an average score per each SC link, from which a global average score is calculated for ECO.I8 indicator.

Table ECO.I8b Conversion scales for sub-indicators considered for the calculation of ECO.I8 indicator.

Whole Chicken Visual Aspect		Cut Parts or Processed Products Visual Aspect		Modified-Atmosphere Packaging		Taste	
Answer	**Points**	**Answer**	**Points**	**Answer**	**Points**	**Answer**	**Points**
Very good	3	Very good	3	Yes (≥60% of products)	2	Very good	2
Good	2	Good	2	Yes (<60% of products)	1	Good	1.5
Medium good	1	Medium good	1	No	0	Quite good	1
Bad	0	Bad	0			Acceptable	0

ECO.I9–Cooperation between Supply Chain Operators

(15 points; 2 sub-indicators)

Table ECO.I9a Description of the sub-indicators[1] considered for the calculation of ECO.I9 indicator.

Scheme	Unit	Scale or SC Links Concerned	Method(s)	Origin of Data
Working groups on chicken production issues (5 points)	ordinal scale	whole SC	survey	operators
Quality of interactions with the other SC operators (10 points)	ordinal scale	whole SC (except chicken farms)	survey	operators

[1] Average scores for each sub-indicator are calculated and added to provide the final score of the ECO.I9 indicator.

Table ECO.I9b Conversion scale for sub-indicator "Working groups on chicken production issues".

Meetings with other SC operators	
Answer	**Points**
Yes (≥ 2 SC links involved)	5
Yes (< 2 SC links involved)	3
No	0

Table ECO.I9c Conversion scale for sub-indicator "Quality of interactions with the other SC operators". 10 is considered to be the best grade.

Meetings with other SC operators	
Answer	**Points**
10	10
8–9	8
6–7	6
4–5	4
2–3	2
0–1	0

ECO.I10–Diffusion of Technical Innovation in the Supply Chain

(10 points; 8 sub-indicators)

Table ECO.I10a Description of the sub-indicators[1] considered for the calculation of ECO.I10 indicator.

Sub-indicator	Unit	Scale or SC Links Concerned	Method(s)	Origin of Data
R&D division in companies (1 point)	yes / no [1]	whole SC (except chicken farms, production organizations)	survey [2]	operators
Work with other companies/structures (1 point)	yes / no [1]	whole SC (except chicken farms, production organizations)	survey [2]	operators
Accessibility to information (3 points)	ordinal scale	whole SC (except chicken farms, production organizations)	survey [2]	operators
Information source: magazines (0.5 points)	yes / no [1]	chicken farms, production organizations	survey [2]	operators, farmers
Information source: open farm events (1 points)	yes / no [1]	chicken farms, production organizations	survey [2]	operators, farmers
Information source: training day (1.5 points)	yes / no [1]	chicken farms, production organizations	survey [2]	operators, farmers
Easy access to information (1 points)	yes / no [1]	chicken farms, production organizations	survey [2]	operators, farmers
Work with other companies/structures (1 point)	yes / no [1]	chicken farms, production organizations	survey [2]	operators, farmers

[1] 0 point when the answer is no.

[2] For each survey, scores of the three or five sub-indicators are added before the calculation of an average score per SC link. The two global average scores are added to provide the final score of the ECO.I10 indicator.

Table ECO.I10b Conversion scale for sub-indicator "Accessibility to information". 10 is considered to be the best grade.

Accessibility to information	
Answer	**Points**
8–10	3
5–7	2
2–4	1
0–1	0

ECO.I11–Budget Allocated for R&D and Development of Innovative Tools and Services in the Supply Chain

(8 points; 1 indicator)

Table ECO.I11a Description of ECO.I11 indicator.

Indicator	Unit	Scale or SC Links Concerned	Method(s)	Origin of Data
Budget allocated for R&D and development of innovative tools and services in the supply chain (8 points)	%	hatchery, slaughtering, food processing	survey [1]	operators

[1] For each survey, an average score per SC link is calculated, from which a global average score is calculated and used as the final score for the ECO.I11 indicator.

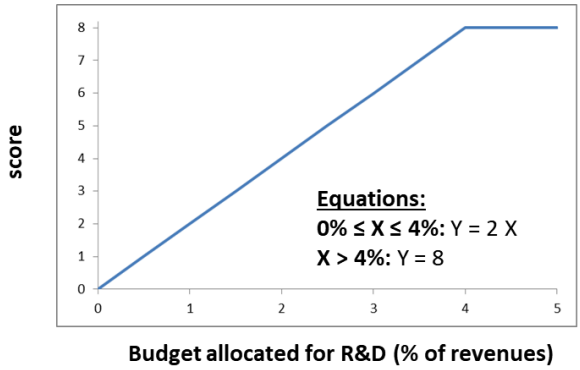


Figure 7. Conversion scale for ECO.I11 indicator.

ECO.I12–Level of overall investment (excluding R&D)

(8 points; 3 sub-indicators)

Table ECO.I12a Description of the sub-indicators[1] considered for the calculation of ECO.I12 indicator.

Sub-indicator	Unit	Scale or SC Links Concerned	Method(s)	Origin of Data
Overall investment (excluding R&D) (4 points)	%	hatchery, feed production, slaughtering, food processing	survey [2]	operators
Construction rate of new chicken houses in the production organization (3 points)	%	production organizations	survey [3]	operators
Renovation rate of chicken houses in the production organization (1 point)	%	production organizations	survey [3]	operators

[1] Final score of ECO.I12 indicator is calculated as the sum of the score of the three sub-indicators.

[2] For each survey, an average score per SC link is calculated, from which a global score for the sub-indicator is calculated with the following weighting: *50% slaughtering + food processing; 30% feed production; 20% hatchery*.

[3] For each sub-indicator, an average score with answers of all surveyed operators is calculated.

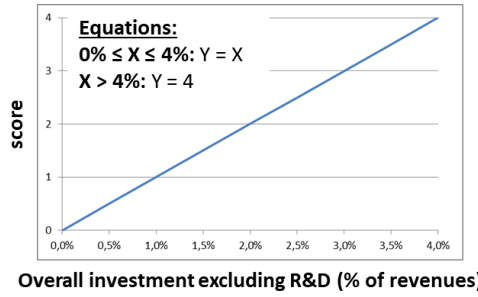


Figure ECO.I12a Conversion scale for sub-indicator "Overall investment (excluding R&D)".

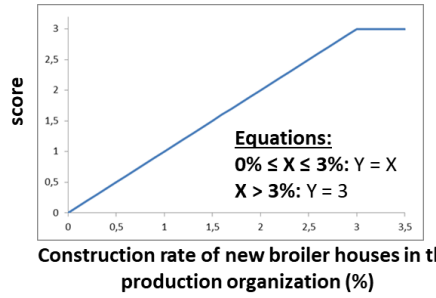


Figure ECO.I12b Conversion scale for sub-indicator "Construction rate of new chicken houses in the production organization".

Table 12. b. Conversion scale for sub-indicator "Renovation rate of chicken houses in the production organization".

Answer	Points
≥5%	1
<5%	0

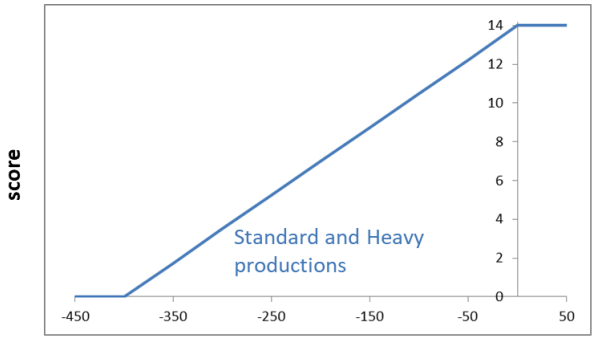
ECO.I13–Net Balance of Chicken Trade Volume between France and European Union

(14 points; 1 indicator)

Table ECO.I13 Description of ECO.I13 indicator.

Indicator	Unit	Scale or SC links concerned	Method(s)	Origin of data
Net balance of chicken trade volume between France and European Union [1] (14 points)	1000 tonnes of carcass weight equivalent	national production	database	http://www.franceagrimer.fr/

[1] Net balance = Exported volumes–Imported volumes.



Equations:
X < -400: Y = 0
-400 ≤ X ≤ 0: Y = 0.035 X +14
X > 0: Y = 14

For « export » supply chain where chickens are exported to non-European countries. In that case, the score for the ECO.I13 indicator is 0. When the net balance is positive, maximum score is given.

For Label Rouge and Certified (medium growth) chickens: IF net balance ≤ 0 THEN score = 0 ELSE score = 14.

When there is no trade between France and European Union, the score is 0.

Figure ECO.I13 Conversion scale for ECO.I13 indicator.

ECO.I14–Net Balance of Chicken Trade Volume Between France and Non-EU Countries

(5 points; 1 indicator)

Table ECO.I14 Description of ECO.I14 indicator.

Indicator	Unit	Scale or SC links concerned	Method(s)	Origin of data
Net balance of chicken trade volume between France and European Union [1] (5 points)	1000 tonnes of carcass weight equivalent	national production	database	http://www.franceagrimer.fr/

[1] Net balance = Exported volumes–Imported volumes (total chicken products).

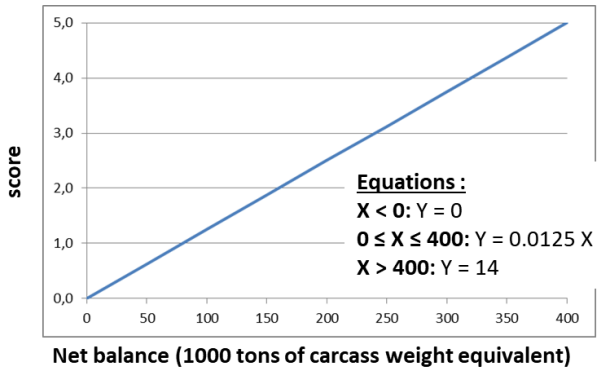


Figure ECO.I14 Conversion scale for ECO.I14 indicator.

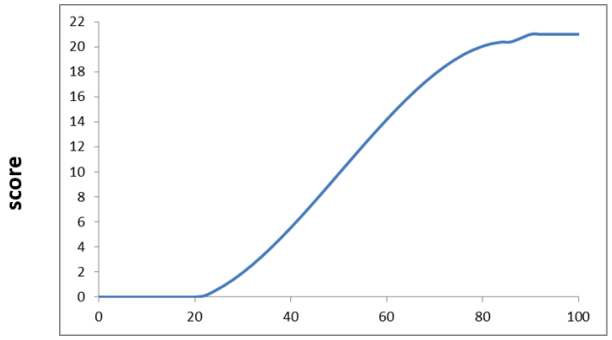
ECO.I15–European Share of Vegetal Proteins in Chicken Fee

(21 points; 1 indicator)

Table ECO.I15 Description of ECO.I15 indicator.

Indicator	Unit	Scale or SC Links con-Cerned	Method (s)	Origin of Data
European share of vegetal proteins in chicken feed (21 points)	%	feed production	survey [1]	operators

[1] Average feed produced by feed producers in the SC.



Equations :
0% ≤ X ≤ 20%: Y = 0
20% < X ≤ 90%: $Y = - 0.000119 X^3 + 0.01793 X^2 - 0.4564 X + 2.738$
X > 90%: Y = 21

Figure ECO.I15 Conversion scale for ECO.I15 indicator.

Social Pillar

SOC.I1–Level of Overall Investment (excluding R&D)

(24 points; 3 sub-indicators)

Table SOC.I1a Description of the sub-indicators considered for the calculation of SOC.I1 indicator.

Sub-indicator	Unit	Scale or SC Links Concerned	Method(s)	Origin of Data
Respect of sanitary legislation (REGL)	yes / no	slaughtering, food processing	survey [1]	operators
Presence of control plan (PLAN)	yes / no	slaughtering, food processing	survey [1]	operators
Nutritional quality of the products (24 points)	%	slaughtering, food processing	SAIN LIM method Darmon et al. Am J Clin Nutr 2009;89:1227–36	table CIQUAL ANSES (https://pro.anses.fr/tableciqual/)

[1] When several operators are surveyed, an average score for each SC link is calculated, and used to calculate a global average score.

Table SOC.I1b Nutritional quality of different poultry products using the SAIN LIM method. Breast meat is considered as the "best" product.

Product	Whole chicken	Breast meat	Leg	Nuggets	Ham	Schnitzel or Cordon bleu or Sausage
% of production[3] ($prod_i$)	$prod_1$	$prod_2$	$prod_3$	$prod_4$	$prod_4$	$prod_5$
Nutritional quality per product (nut_i)[4]	nut_1 = 18	nut_2 = 24	nut_3 = 18	nut_4 = 6	nut_5 = 12	nut_6 = 6

[3] Obtained by surveying operators.

Calculation of final score for SOC.I1 indicator:

$$Final\ score = \propto \times \sum_{i=1}^{6} \prod_{i=1}^{6} prod_i \times nut_i$$

With:
$\propto = 0$ if REGL = no
$\propto = 1$ if REGL = yes and PLAN = yes
$\propto = 0.6$ if REGL = yes and PLAN = no

SOC.I2–Purchasing Capacity for Products

(21 points; 2 sub-indicators)

Table SOC.I2a Description of the sub-indicators[1] considered for the calculation of SOC.I2 indicator.

Sub-indicator	Unit	Scale or SC Links Concerned	Method(s)	Origin of Data
Number of hours of minimum wage required to buy the product (15 points)	h / kg product	retailing	survey, database [2]	Operators; ITAVI 2013; KANTAR panel 2012
Presence of the product on all market segments (whole chicken, cut parts, processed food) (6 points)	number of market segments	retailing	survey	operators

[1] For each surveyed operator, the sum of the two sub-indicators is calculated. An average of these sums is used as the final score of SOC.I2 indicator.

[2] The number of hours is linked to the type of products considered (5 categories) and the values are taken from the mentioned databases.

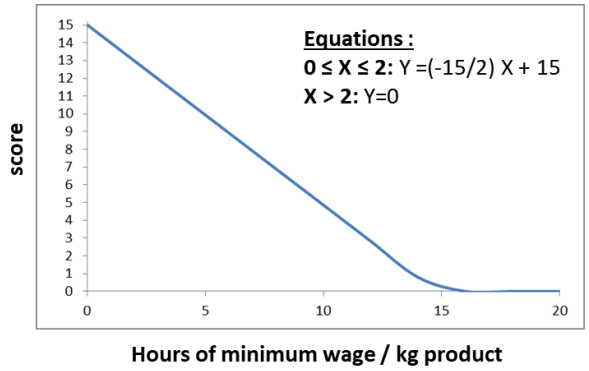


Figure SOC.I2 Conversion scale for sub-indicator "Number of hours of minimum wage required to buy the product".

Table SOC.I2b Conversion scale for sub-indicator "Presence of the product on all market segments".

Answer	Points
0	0
1	2
2	4
3	6

SOC.I3–Existence of a Logo Stating the French Origin

(7 points; 1 indicator)

Table SOC.I3a Description of SOC.I3 indicator.

Indicator	Unit	Scale or SC Links Concerned	Method(s)	Origin of Data
Presence of a logo "French poultry" or an official sign of quality (7 points)	ordinal scale	slaughtering, food processing, retailing	survey [1]	operators

[1] An average score per SC link is calculated, from which a global average score for SOC.I3 indicator is calculated.

Table SOC.I3b Conversion scale for SOC.I3 indicator.

Answer	Points
Official sign of quality (Label Rouge, organic farming…)	7
French poultry	4
No logo	0

SOC.I4–Statement on Absence of GMO in Chicken Feed

(7 points; 1 indicator)

Table SOC.I4a Description of SOC.I4 indicator.

Indicator	Unit	Scale or SC Links Concerned	Method (s)	Origin of Data
Explicit mention on non-GMO animal feed (7 points)	ordinal scale	slaughtering, food processing, retailing	survey [1]	operators

[1] An average score per SC link is calculated, from which a global average score for SOC.I3 indicator is calculated.

Table SOC.I4b Conversion scale for SOC.I4 indicator.

Answer	Points
Yes	7
No but non-GMO feed in required in chicken farms	4
No	0

SOC.I5–Statement on European Origin of Feedstuffs used in Chicken's Feed

(7 points; 1 indicator)

Table SOC.I5a Description of SOC.I5 indicator.

Indicator	Unit	Scale or SC links concerned	Method(s)	Origin of data
Explicit mention on the European origin of feedstuffs used in animal feed (4 points)	ordinal scale	slaughtering, food processing, retailing	survey [1]	operators

[1] An average score per SC link is calculated, from which a global average score for SOC.I3 indicator is calculated.

Table SOC.I5b Conversion scale for SOC.I5 indicator.

Explicit Mention on the European Origin of Feedstuffs used in Animal Feed	
Answer	**Points**
Cereals and proteins	4
Cereals only	2
No	0

SOC.I6–Chicken Welfare

(21 points; 10 indicator)

Table SOC.I6 Description of the sub-indicators[1] considered for the calculation of SOC.I6 indicator.

Sub-indicator	Unit	Scale or SC Links Concerned	Method(s)	Origin of Data
Outdoor access for the chickens (1 point)	yes / no[2]	chickens farms, production organizations	survey	operators
Natural light in the chicken house (1 point)	yes / no[2]	chickens farms, production organizations	survey	operators
Animal density (3 points)	kg/m²	chickens farms, production organizations	survey	operators
Transport duration from hatchery to farm (2 points)	h	chickens farms, production organizations	survey	operators
Transport duration from farm to slaughterhouse (2 points)	h	chickens farms, production organizations	survey	operators
Mortality rate in farms (5 points)	%	chickens farms, production organizations	survey	operators
Footpad lesions (2 points)	score over 200	slaughtering	survey	operators
Infected skin lesions (2 points)	yes / no[3]	slaughtering	survey	operators
Breast blisters (2 points)	yes / no[3]	slaughtering	survey	operators
Corneal reflex (4 points)	%	slaughtering	survey	operators

[1] An average score per SC link is calculated, from which a global average score is calculated. As the sum of all sub-indicators could exceed 21 (max = 24), this global average score is then multiplied by 21/24 to calculate the final score of SOC.I3 indicator.

[2] 0 point when the answer is no.

[3] 0 point when the answer is yes.

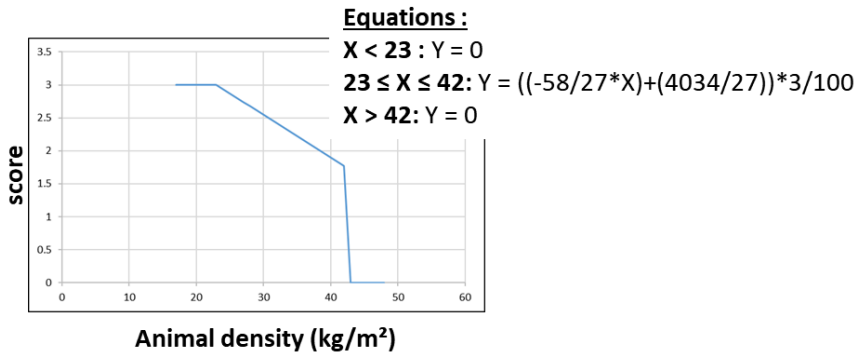


Figure SOC.I6a Conversion scale for sub-indicator "Animal density".

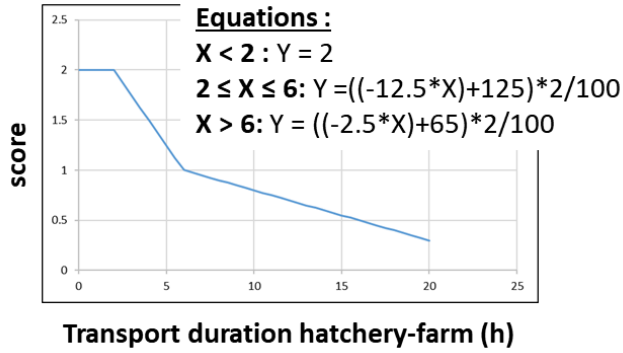


Figure SOC.I6b Conversion scale for sub-indicator "Transport duration from hatchery to farm".

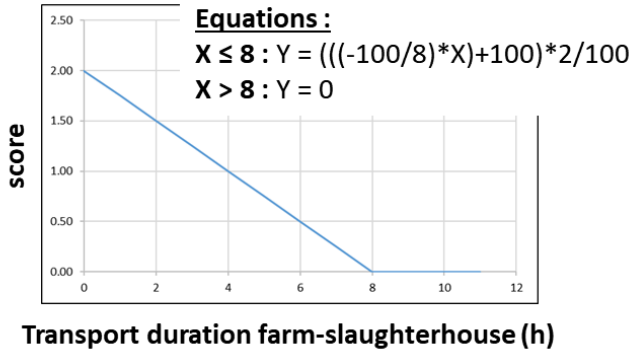


Figure SOC.I6c Conversion scale for sub-indicator "Transport duration from farm to slaughterhouse".

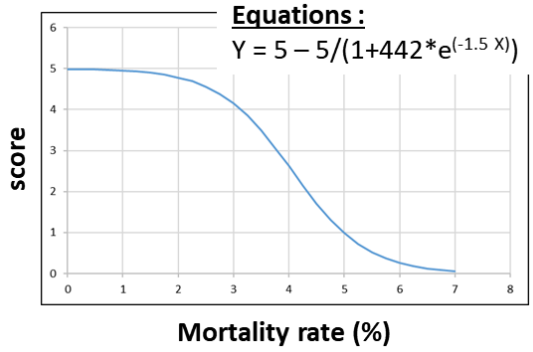


Figure SOC.I6d Conversion scale for sub-indicator "Mortality rate in farms".

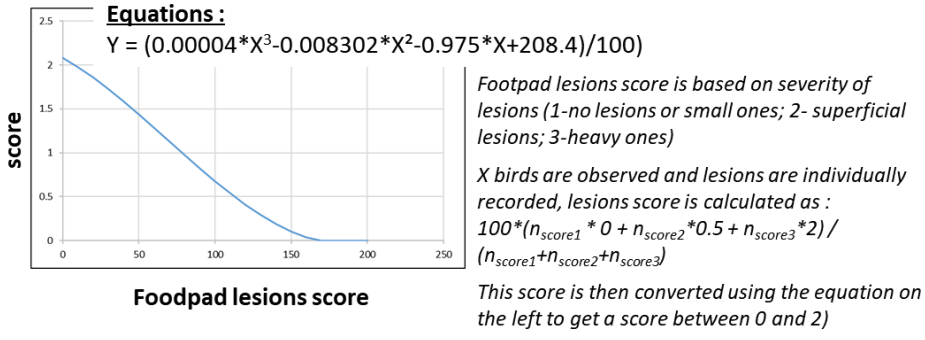


Figure SOC.I6e Conversion scale for sub-indicator "Footpad lesions".

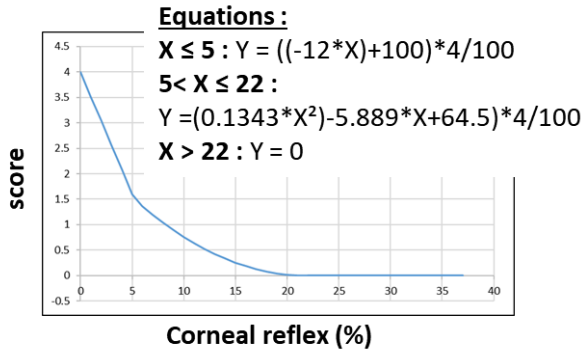


Figure SOC.I6f Conversion scale for sub-indicator "Corneal reflex".

SOC.I7–Workers' Welfare for Each Link in the Supply Chain

(18 points; 7 sub-indicators)

Table SOC.I7a Description of the sub-indicators[1] considered for the calculation of SOC.I7 indicator.

Sub-indicator	Unit	Scale or SC Links Concerned	Method (s)	Origin of Data
Occupational illness (5 points)[2]	%	whole SC	survey	operators
Perception of the income comparatively to working time (3 points)	ordinal scale	chicken farms	survey	operators
Perception of the work (3 points)	ordinal scale	chicken farms	survey	operators
Perception about the availability of free time (3 points)	ordinal scale	chicken farms	survey	operators
Perception of stress and penibilty of work (3 points)	ordinal scale	chicken farms	survey	operators
Perception of professional isolation (2 points)	ordinal scale	chicken farms	survey	operators
Confidence in the future (3 points)	ordinal scale	chicken farms	survey	operators

[1] An average score per sub-indicator is calculated. Final score for SOC.I7 indicator is the sum of all average sub-indicators scores.

[2] An average score per SC link is calculated. Final score for this sub-indicator is the average of average score per SC link.

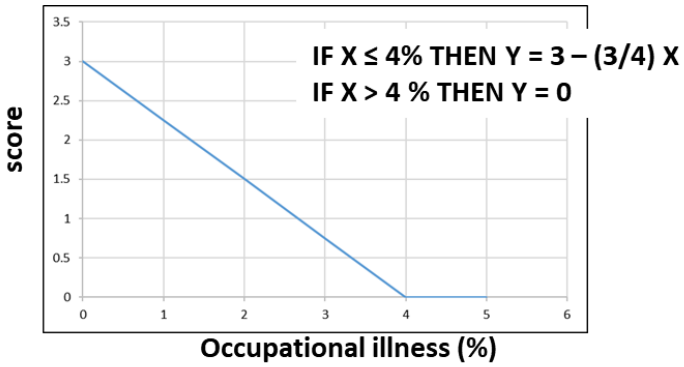


Figure SOC.I7 Conversion scale for sub-indicator "Occupational illness". If a corporate social responsibility (CSR) plan is set up, two additional points are given.

Table SOC.I7b Conversion scales for sub-indicators considered for the calculation of SOC.I7 indicator. If the sum of the six sub-indicators is above 13, the final score retained is 13.

Perception of the Income Comparatively to Working Time		**Perception of the Work**		**Perception about the Availability of Free Time**	
Answer	**Points**	**Answer**	**Points**	**Answer**	**Points**
Satisfied	3	Fulfilling	3	Satisfied	3
Quite satisfied	2	Interesting	2	Quite satisfied	2
Quite unsatisfied	1	Bearable	1	Quite unsatisfied	1
Unsatisfied	0	Unbearable	0	Unsatisfied	0
Perception of Stress and Penibilty of work		**Perception of Professional Isolation**		**Confidence in the Future**	
Answer	**Points**	**Answer**	**Points**	**Answer**	**Points**
Not laborious & not stressful	3	Not isolated	2	Very confident	3
Moderately laborious but not stressful	2.5	Quite isolated	1	Quite confident	2
Not laborious but stressful	2	Very isolated	0	Little confident	1
Moderately laborious but not stressful	1.5			Not confident	0
Laborious but not stressful	1				
Laborious & stressful	0				

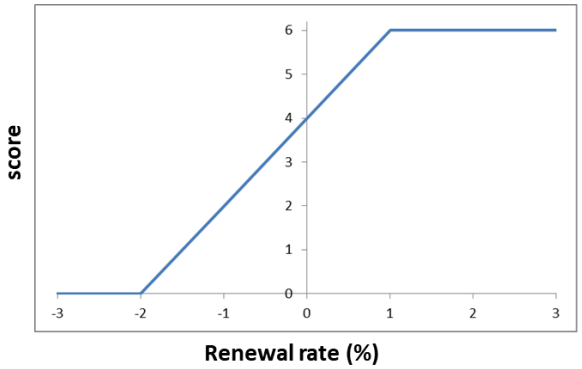
SOC.I8–Renewal of Poultry Farms

(6 points; 1 indicator)

Table SOC.I8 Description of SOC.I8 indicator.

Sub-indicator	Unit	Scale or SC Links Concerned	Method(s)	Origin of Data
Renewal rate of poultry farms[1] (6 points)	%	chicken farms	database	ITAVI

[1] Difference between chicken houses construction and loss rates.



Equations :
X < -2%: Y = 0
-2% ≤ X ≤ 1%: Y = 2 X + 4
X > 1%: Y = 6

Figure SOC.I8 Conversion scale for SOC.I8 indicator.

SOC.I9–Communication with Public about Poultry Sector

(24 points; 10 sub-indicators)

Table SOC.I9 Description of the sub-indicators[1] considered for the calculation of SOC.I9 indicator.

Sub-indicator	Unit	Scale or SC Links Concerned	Method(s)	Origin of Data
Documentary / TV report (3 points)	yes / no [2]	whole SC	survey	operators
TV advertising (2 points)	yes / no [2]	slaughtering, food processing, retailing	survey	operators
Radio advertising (2 points)	yes / no [2]	slaughtering, food processing, retailing	survey	operators
Urban advertising (2 points)	yes / no [2]	whole SC (except chicken farms and production organizations)	survey	operators
Press advertising (2 points)	yes / no [2]	whole SC (except chicken farms and production organizations)	survey	operators
Public exhibitions (3 points)	yes / no [2]	whole SC (except chicken farms and production organizations)	survey	operators
Communication training (2 points)	yes / no [2]	whole SC	survey	operators
In-stores events (3 points)	yes / no [2]	retailing	survey	operators
Farm visits (3 points)	yes / no [2]	chicken farms and production organizations	survey	operators
Other (2 points)	yes / no [2]	whole SC	survey	operators

[1] An average score per sub-indicator is calculated. Final score for SOC.I9 indicator is calculated as the sum of each average score per sub-indicator.

[2] 0 point when the answer is no.

SOC.I10–Existence of a Crisis Management and Media Monitoring Cell

(14 points; 3 sub-indicators)

Table SOC.I10 Description of the sub-indicators[1] considered for the calculation of SOC.I10 indicator.

Scheme	Unit	Scale or SC Links Concerned	Method(s)	Origin of Data
Crisis prevention plan (4 points)	yes / no [2]	slaughtering, food processing, retailing	survey	operators
Crisis management plan (5 points)	yes / no [2]	slaughtering, food processing, retailing	survey	operators
Media monitoring cell (5 points)	yes / no [2]	slaughtering, food processing, retailing	survey	operators

[1] For each surveyed operator, the sum of the scores of the three sub-indicators is calculated. An average score per SC link is calculated, from which a global average score for SOC.I10 indicator is calculated.

[2] 0 point when the answer is no.

SOC.I11–Professional Responsibility of Poultry Sector Stakeholders

(5 points; 1 indicator)

Table SOC.I11a Description of SOC.I11 indicator.

Sub-indicator	Unit	Scale or SC links concerned	Method(s)	Origin of data
Participation to professional organizations, syndicates, directorial board(5 points)	number of professional responsibilities	whole SC (except retailing)	survey [1]	operators

[1] An average for companies in all SC links is calculated (*i.e.* without chicken farms). The final score for SOC.I11 indicator is calculated as the average between the average score for chicken farms and companies, in order to give more weight to chickens farms.

Table SOC.I11b Conversion scale for SOC.I11 indicator.

Number of Professional Responsibilities	
Answer	**Points**
≥2	5
1	2.5
0	0

SOC.I12–Local and Regional Supply for Mass Catering

(5 points; 1 indicator)

Table SOC.I12 Description of SOC.I12 indicator.

Sub-indicator	Unit	Scale or SC Links Concerned	Method(s)	Origin of Data
Supplying local mass catering operators with poultry products (5 points)	% of volumes sold to local (<100 km) mass catering	slaughtering	survey [1]	operators

[1] The final score for the SOC.I12 is calculated as the average between answers of the different surveyed operators.

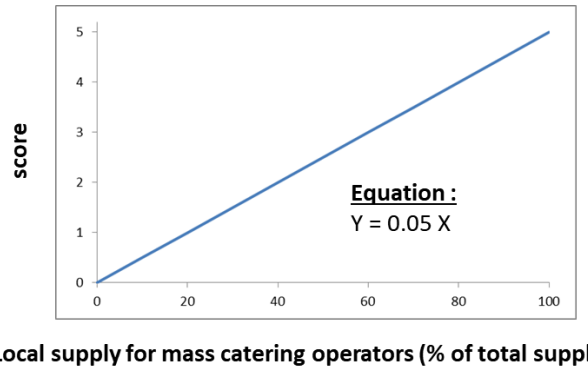


Figure SOC.I12 Conversion scale for SOC.I12 indicator.

SOC.I13–Extra-Professional Responsibility of Poultry Industry Stakeholders within the Territory

(4 points; 2 sub-indicators)

Table SOC.I13 Description of the sub-indicators[1] considered for the calculation of SOC.I13 indicator.

Sub-indicator	Unit	Scale or SC Links Concerned	Method(s)	Origin of Data
Sponsoring of local events (sport, music…) (2 points)	yes / no [2]	whole SC (except chicken farms, production organizations, retailing)	survey [3]	operators, farmers
Participation to local life (political life, local associations…) (2 points)	yes / no [2]	chicken farms, production organizations	survey [3]	operators, farmers

[1] The final score of the SOC.I13 indicator is calculated as the sum score of both sub-indicators.

[2] 0 point when the answer is no.

[3] An average score per SC link is calculated. A global average score for the sub-indicator is calculated using these average scores.

SOC.I14–Approval of Installation and Expansion Requests in the Territory

(20 points; 2 sub-indicators)

Table SOC.I14a Description of the sub-indicators[1] considered for the calculation of SOC.I14 indicator.

Sub-indicator	Unit	Scale or SC Links Concerned	Method(s)	Origin of Data
Difficulties during farm installation/expansion procedures (10 points)	ordinal scale	production organization, chicken farms	survey	operators, farmers
Time to get the approval (10 points)	months	production organization, chicken farms	survey	operators, farmers

[1] For each surveyed operator, the scores of the two sub-indicators are added, before the calculation of an average score per SC link. The final score of the SOC.I14 is calculated as the average of these two average scores.

Table SOC.I14b Conversion scales for the sub-indicators[1] considered for the calculation of SOC.I14 indicator.

Difficulties during Farm Installation/Expansion Procedures		Time to Get the Approval	
Answer	**Points**	**Answer**	**Points**
Easy	10	0–6 months	10
Quite easy	6	6–12 months	7
Difficult	3	12–24 months	4
Very difficult	0	>24 months	0

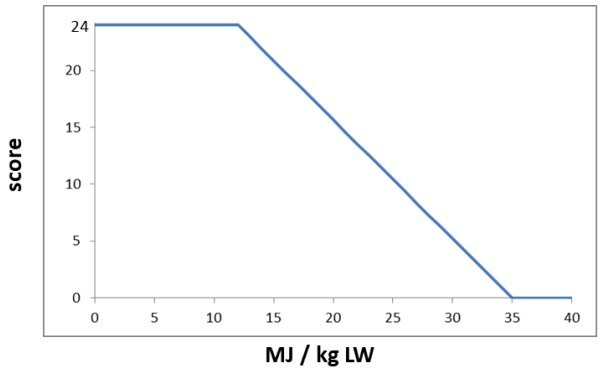
Environmental Pillar

ENV.I1–Consumption of Non-renewable Energy

(24 points; 1 indicator)

Table ENV.I1 Description of ENV.I1 indicator.

Sub-indicator	Unit	Scale or SC Links Concerned	Method(s)	Origin of Data
Amount of non-renewable energy used (24 points)	MJ / kg live weight	cradle to farm gate	Life Cycle Analysis (LCA)	operators, LCA databases, emission models



Equations :
X < 12: Y = 24
12 ≤ X ≤ 35: Y = (24/23) X + (840/23)
X > 35: Y = 0

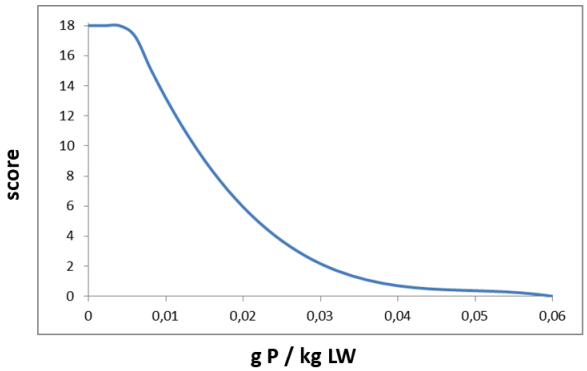
Figure ENV.I1 Conversion scale for ENV.I1 indicator.

ENV.I2–Consumption of Phosphates by Crops and Animals

(18 points; 1 indicator)

Table ENV.I2 Description of ENV.I2 indicator.

Sub-indicator	Unit	Scale or SC Links Concerned	Method(s)	Origin of Data
Amount of mineral phosphate used for the fertilization of crops used in chicken feed, or directly used as a phosphorus source in chicken feed (18 points)	g P / kg live weight	cradle to farm gate	Life Cycle Analysis (LCA)	operators, LCA databases, emission models



Equations :
X ≤ 5: Y = 18
5 < X < 60: $Y = -0.000915\ X^3 + 0.02906\ X^2 - 1.459\ X + 25.05$
X ≥ 60: Y = 0

Figure ENV.I2 Conversion scale for ENV.I2 indicator.

ENV.I3–TotalA of Water Taken from Public Network

(14 points; 2 sub-indicators)

Table ENV.I3 Description of the sub-indicators[1] considered for the calculation of ENV.I3 indicator.

Sub-indicator	Unit	Scale or SC Links Concerned	Method(s)	Origin of Data
Amount of water taken from public network (12 points)	m^3 / kg LW	cradle to farm gate	Life Cycle Analysis (LCA)	operators, LCA databases, emission models
Annual rainfall (2 points)[2]	mm / year	region	database	MeteoFrance

[1] The final score of the ENV.I3 indicator is calculated as the sum of the two sub-indicators' scores.

[2] Two additional points are given when the territory in which the studied SC is located is not limiting in water (i.e. annual rainfall ≥ 800 mm/year).

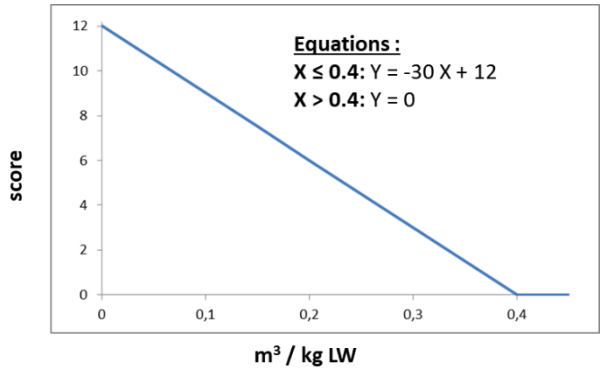


Figure ENV.I3 Conversion scale for sub-indicator "Amount of water taken from public network".

ENV.I4–Approval of Installation and Expansion Requests in the Territory

(7 points; 1 indicator)

Table ENV.I4a Description of ENV.I4 indicator.

Sub-indicator	Unit	Scale or SC Links Concerned	Method(s)	Origin of Data
Number of pedigree lines currently used for genetic selection of chickens (7 points)	number of pedigree lines	genetic selection	survey	operators

Table ENV.I4b Conversion scale for ENV.I4 indicator.

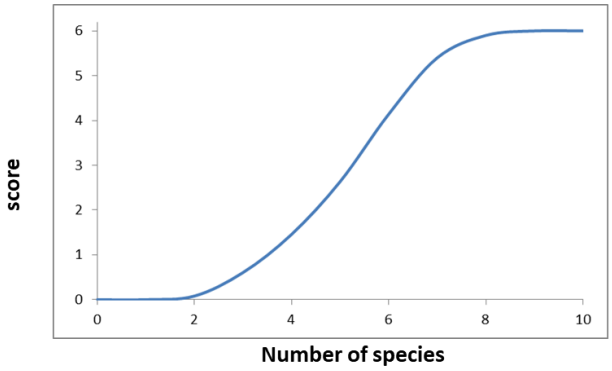
Number of Pedigree Lines	
Answer	**Points**
>40	7
[31–40]	6
[21–30]	4
[11–20]	2
[0–10]	0

ENV.I5–Number of Vegetal Species used in Chickens Feed

(6 points; 1 indicator)

Table ENV.I5 Description of ENV.I5 indicator.

Sub-indicator	Unit	Scale or SC Links Concerned	Method(s)	Origin of Data
Number of vegetal species composing diets fed to chickens (6 points)	number of species	feed production	survey	operators



Equations :

0 ≤ X ≤ 7: $Y = 0.1637 X^2 - 0.2945 X + 0.01463$

X > 7: $Y = 6$

Figure ENV.I5 Conversion scale for ENV.I5 indicator.

ENV.I6–Total Emission of Greenhouse Gas

(16 points; 1 indicator)

Table ENV.I6 Description of ENV.I6 indicator.

Sub-indicator	Unit	Scale or SC Links Concerned	Method(s)	Origin of Data
Amount of greenhouse gas (16 points)	kg CO_2-eq / kg live weight	cradle to farm gate	Life Cycle Analysis (LCA)	operators, LCA databases, emission models

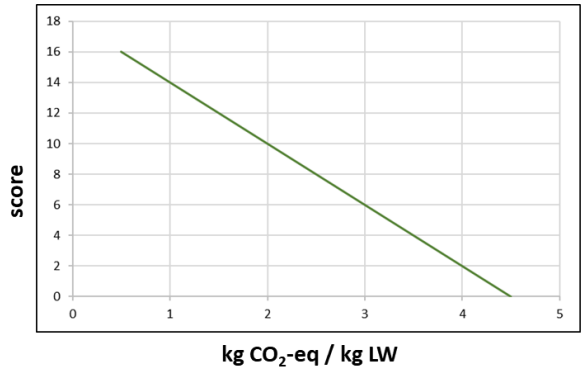


Figure ENV.I6 Conversion scale for ENV.I6 indicator.

ENV.I7–Total Particle Emission

(8 points; 1 indicator)

Table ENV.I7a Description of ENV.I7 indicator.

Sub-indicator	Unit	Scale or SC Links Concerned	Method(s)	Origin of Data
Amount of Total Suspended Particulate (TSP) (8 points)	kg TSP / animal / year	chicken farms	literature	EMEP, 2009. Air pollutant emission inventory guidebook

Table ENV.I7b Conversion scale for ENV.I7 indicator.

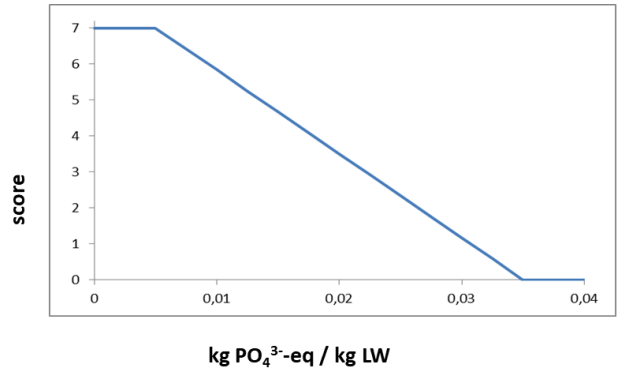
kg TSP / Animal / Year	
Answer	**Points**
[0–0.5]	8
]0.5–1]	6
]1–1.5]	4
]1.5–2]	2
>2	0

ENV.I8–Eutrophication

(7 points; 1 indicator)

Table ENV.I8 Description of ENV.I8 indicator.

Sub-indicator	Unit	Scale or SC Links Concerned	Method(s)	Origin of Data
Potential eutrophication (7 points)	kg PO_4^{3-}-eq / kg live weight	cradle to farm gate	Life Cycle Analysis (LCA)	operators, LCA databases, emission models



Equations :
0.005 < X: Y = 7
0.005 ≤ X ≤ 0.035: Y = (-7/0.03) X + (0.245/0.03)
X > 0.035: Y = 0

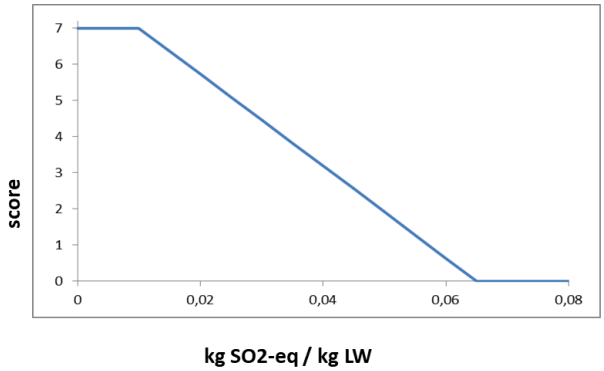
Figure ENV.I8 Conversion scale for ENV.I8 indicator.

ENV.I9–Acidification

(7 points; 1 indicator)

Table ENV.I9 Description of ENV.I9 indicator.

Sub-indicator	Unit	Scale or SC Links Concerned	Method(s)	Origin of Data
Potential acidification (7 points)	kg SO_2-eq / kg live weight	cradle to farm gate	Life Cycle Analysis (LCA)	operators, LCA databases, emission models



Equations :
0.01 < X: Y = 7
0.01 ≤ X ≤ 0.065: Y = (-7/0.055) X + (7*0.065/0.055)
X > 0.065: Y = 0

Figure ENV.I9 Conversion scale for ENV.I9 indicator.

ENV.I10–Total Particle Emission

(6 points; 1 indicator)

Table ENV.I10a Description of ENV.I10 indicator.

Sub-indicator	Unit	Scale or SC Links Concerned	Method(s)	Origin of Data
Potential ecotoxicity (6 points)	CTUe / kg live weight	cradle to farm gate	Life Cycle Analysis (LCA)	operators, LCA databases, emission models

CTUe: Comparative Toxic Unit.

Table ENV.I10b Conversion scale for ENV.I10 indicator.

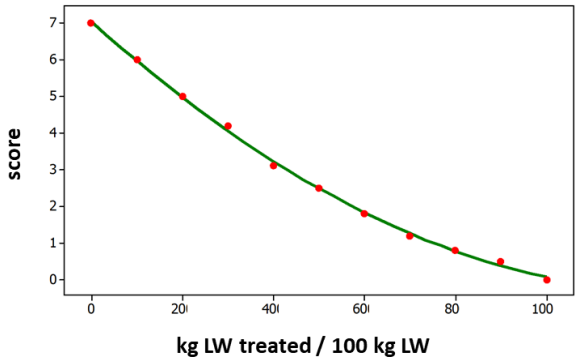
CTUe/Kg Live Weight	
Answer	**Points**
[0–1]	6
]1–2]	3
>2	0

ENV.I11–Use of Allopathic Treatments

(7 points; 1 indicator)

Table ENV.I11 Description of ENV.I11 indicator.

Sub-indicator	Unit	Scale or SC Links Concerned	Method(s)	Origin of Data
Amount of antibiotics and anticoccidians used (7 points)	kg live weight treated / 100 kg live weight produced	chicken farms	survey	operators



Equations :

$Y = 4 \times 10^{-4} X^2 - 0.1127 X + 7.055$

Figure ENV.I11 Conversion scale for ENV.I11 indicator.

ENV.I12–Proportion of Used By-products

(17 points; 3 sub-indicators)

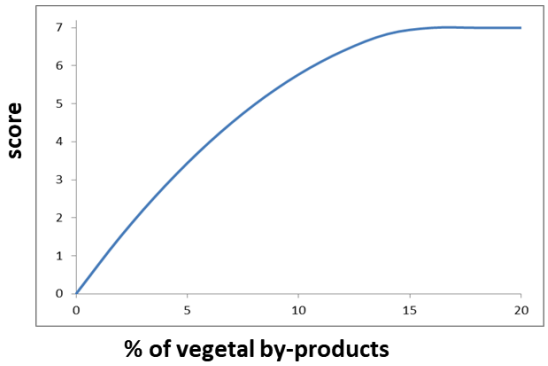
Table ENV.I12a Description of the sub-indicators[1] considered for the calculation of ENV.I12 indicator.

Sub-indicator	Unit	Scale or SC Links Concerned	Method (s)	Origin of Data
Share of animal by-products which are re-used by other operators (4 points)	%	hatchery	survey	operators
Share of animal by-products which are re-used by other operators (6 points)	%	slaughtering	survey	operators
Share of vegetal by-products used in chicken feed (7 points)	%	feed production	survey	operators

[1] For each SC link, an average score is calculated. The final score of ENV.I12 indicator is the sum of the three sub-indicators' scores.

Table ENV.I12b Conversion scale for sub-indicator "Share of animal by-products which are re-used by other operators".

Share of animal by-products re-used in the SC			
Hatchery		**Slaughterhouses**	
Answer	**Points**	**Answer**	**Points**
>80%	4	*>90%*	6
]70%–80%]	3	*]70%–90%]*	4
]60%–70%]	2	*]50%–70%]*	2
]50%–60%]	1	*[0%–50%]*	0
[0%–50%]	0		



Equations :

X ≤ 14 : $Y = -0.02219 X^2 + 0.7987 X + 0.003506$

X ≥ 14: $Y = 7$

Figure ENV.I12 Conversion scale for sub-indicator "Share of vegetal by-products used in chicken feed".

ENV.I13–Integration of Production Equipment into Landscape

(11 points; 13 sub-indicators)

Table ENV.I13a Description of the sub-indicators[1] considered for the calculation of ENV.I13 indicator.

Sub-indicator	Unit	Scale or SC Links Concerned	Method(s)	Origin of Data
Color of building materials in harmony with landscape (1 point)	ordinal scale	genetic selection, hatchery, firm services, feed production, slaughtering, food processing	survey	operators
Cleanliness around buildings (0.5 point)	ordinal scale	genetic selection, hatchery, firm services, feed production, slaughtering, food processing	survey	operators
Plants around buildings (1 point)	yes / no [2]	genetic selection, hatchery, firm services, feed production, slaughtering, food processing	survey	operators
Trees around buildings (1 point)	yes / no [2]	genetic selection, hatchery, firm services, feed production, slaughtering, food processing	survey	operators
Mowed lawn (1 point)	yes / no [2]	genetic selection, hatchery, firm services, feed production, slaughtering, food processing	survey	operators
Color of building materials in harmony with landscape (1 point)	ordinal scale	chicken farms	survey	farmers
Wood on chicken houses (0.5 point)	ordinal scale	chicken farms	survey	farmers
Cleanliness around buildings (0.5 point)	ordinal scale	chicken farms	survey	farmers
Quality of surroundings (0.5 point)	ordinal scale	chicken farms	survey	farmers
Accessibility of surrounding for trucks (0.5 point)	yes / no [2]	chicken farms	survey	farmers
Plants around buildings (1 point)	yes / no [2]	chicken farms	survey	farmers
Trees around buildings (2 points)	yes / no [2]	chicken farms	survey	farmers
Grass cover around buildings (0.5 point)	yes / no [2]	chicken farms	survey	farmers

[1] For each SC link, the scores of sub-indicators are added to calculate an average score per SC link. An overall average including genetic selection, hatchery, firm services, feed production, slaughtering and food processing scores is calculated and added to the average score of chicken farms to provide the final score of ENV.13 indicator.

[2] 0 point when the answer is no.

Table ENV.I13b Conversion scale for sub-indicator "Color of building materials in harmony with landscape".

Color of Building Materials in Harmony with Landscape			
Chicken farms		Other SC links	
Answer	Points	Answer	Points

Yes	1	*Yes*	1
Partially	0.5	*No*	0
No	0		

Table ENV.I13c Conversion scales for sub-indicators "Cleanliness around buildings", "Quality of surroundings", and "Wood on chicken houses".

Cleanliness around Buildings		**Quality of Surroundings**		**Wood on Chicken Houses**	
Answer	**Points**	**Answer**	**Points**	**Answer**	**Points**
Clean	0.5	Good quality	0.5	At least one chicken house	0.5
Messy	0	Presence of holes, puddles	0	No	0

ENV.I14–Integration of Production Equipment into Landscape

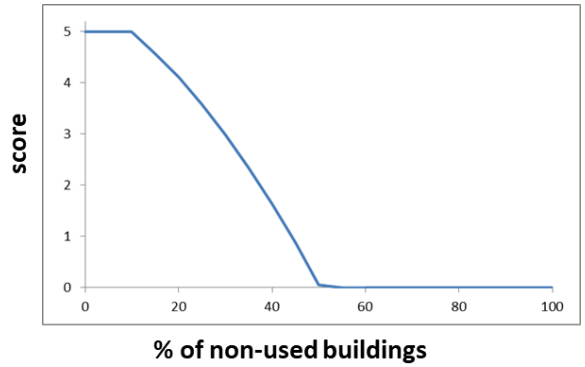
(11 points; 4 sub-indicators)

Table ENV.I14a Description of the sub-indicators[1] considered for the calculation of ENV.I14 indicator.

Sub-indicator	Unit	Scale or SC Links Concerned	Method(s)	Origin of Data
Share of non-used buildings (5 points)	%	chicken farms	survey	farmers
Eco-construction of chicken houses (2 points)	ordinal scale	chicken farms	survey	farmers
Recycling of medical waste (3 points)	yes / no[2]	chicken farms	survey	farmers
Recycling of other waste (1 point)	yes / no[2]	chicken farms	survey	farmers

[1] For each surveyed farm, the sum of the four sub-indicators is calculated. An average of these sums is used as the final score of ENV.I14 indicator.

[2] 0 point when the answer is no.



Equations :

X ≤ 10: Y = 5

10 < X ≤ 50: $Y = -(0.001186\ X^2 - 0.05216\ X + 5.619$

X > 50: Y = 0

Figure ENV.I14 Conversion scale for sub-indicator "Share of non-used buildings".

Table ENV.I14b. Conversion scale for sub-indicator "Eco-construction of chicken houses".

Eco-construction of Chicken Houses	
Answer	**Points**
At least one chicken house	2
No	0

ENV.I15–Agroecological Landscaping in Farms

(11 points; 1 indicator)

Table ENV.I15a Description of ENV.I15 indicator.

Sub-indicator	Unit	Scale or SC Links Con-cerned	Method(s)	Origin of Data
Presence of agro-ecological structures (hedges, meadows, trees…) (11 points)	ha of equivalent surface in topographic elements (STE) [1]	chicken farms	survey, database	farmers

[1] Surface or length of different agro-ecological structures are considered and converted in the same unit (*i.e.* ha of STE; Table ENV.I15b) before being summed. The total surface is then converted using the conversion scale presented in Figure ENV.I15.

Table ENV.I15b Surface in topographic elements (STE) conversion factors.

Agro-ecological Structure	Length or Surface	ha of STE
Hedge with local species	100 linear meters	1
Forest border or grove	100 linear meters	1
Alignment of trees	100 linear meters	0.1
Isolated tree	1 tree	0.005
Low walls	100 linear meters	0.5
Permanent meadows, outdoor run	1 ha	1
Natura 2000 surfaces or permanent meadows (>50 years)	1 ha	2

Source: https://agriculture.gouv.fr/telecharger/96535?token=6d4f782a81c880561d3f19077b9a5d90607ff9ace98f8f2af2b46e0a195e5685.

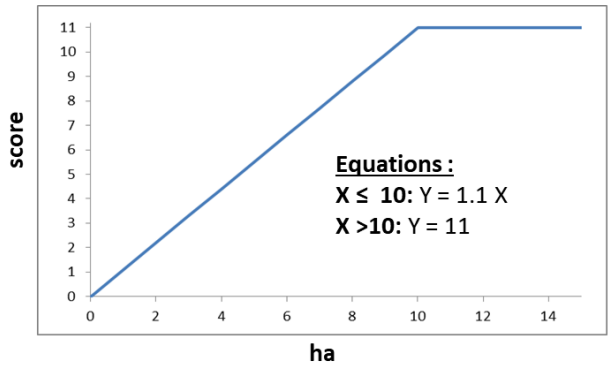


Figure ENV.I15 Conversion scale for ENV.I15 indicator.

ENV.I16–Integration of Production Equipment into Landscape

(10 points; 2 sub-indicators)

Table ENV.I16a Description of the sub-indicators[1] considered for the calculation of ENV.I16 indicator.

Sub-indicator	Unit	Scale or SC Links Con-cerned	Method(s)	Origin of Data
Use of responsible soybean in chicken feed (8 points)	ordinal scale	feed production	survey	operators
Use of responsible palm oil in chicken feed (2 points)	ordinal scale	feed production	survey	operators

[1] The final score of the ENV.I16 indicator is the sum of the two sub-indicators' scores.

Table ENV.I16c Conversion scales for sub-indicators "Cleanliness around buildings", "Quality of surroundings", and "Wood on chicken houses".

Use of Responsible Soybean		Use of Responsible Palm Oil	
Answer	**Points**	**Answer**	**Points**
No use of soybean	8	No use of palm oil	2
European soybean	8	RSPO palm oil [4]	2
RTRS soybean (segregation) [1]	8	Non labelled palm oil	0
ProTerra soybean [2]	7		
RTRS soybean (mass balance) [1]	6		
Non labelled and non-European soybean	0		

[1] Round Table Responsible Soy: http://www.responsiblesoy.org/certification/tipos-de-certificacion/cadena-de-custodia/?lang=en.

[2] http://proterrafoundation.org/files/ProTerra_Standard_V3.0_EN.pdf.

[3] Roundtable on Sustainable Palm Oil: http://www.rspo.org/.