8. ASSESSING, MONITORING & LABELLING POULTRY WELFARE

a) Defining animal welfare

b) Animal welfare indicators (scoring - Dr K. Buyse)

c) Aggregating indicators & monitoring protocols
(Legmoni - Dr N. Van Noten)

d) Poultry welfare label

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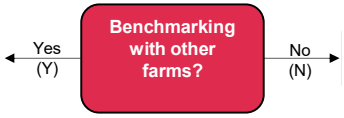
C. AGGREGATING INDICATORS & **MONITORING PROTOCOLS**

Decision tree for choosing appropriate **hen** welfare monitoring tool



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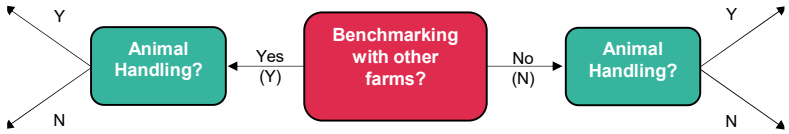
C. AGGREGATING INDICATORS & MONITORING PROTOCOLS

Decision tree for choosing appropriate **hen** welfare monitoring tool



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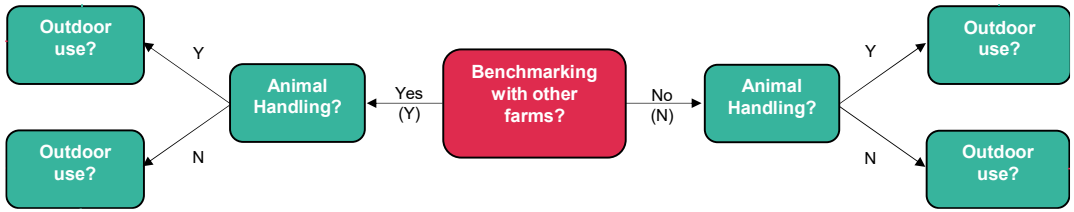
C. AGGREGATING INDICATORS & MONITORING PROTOCOLS

Decision tree for choosing appropriate **hen** welfare monitoring tool



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C. AGGREGATING INDICATORS & MONITORING PROTOCOLS

Decision tree for choosing appropriate **hen** welfare monitoring tool

Self-scans

https://bestpracticehens.eu/wp-content/uploads/2023/07/EN_BPH_protocol_welfare_assessment_FINAL.pdf

KTBL
- THE
- Benchmarking + within farm*

EBENE
- FR, NL, EN
- ± 1h
- Benchmarking + within farm*
- Generic advice

Dierenwelzijnscan
- EN
- 1,5 h
- Benchmarking + within farm*
- Generic advice

Welfare Certification system
- ES
- 4-6 h
- Benchmarking + within farm*
- Generic advice

LayWel
- AND
- Within farm*
- Generic advice

Welfare Quality Protocol
- AND
- 0.5 day
- Within farm*
- Generic advice

Chicken compass
- EN
- Within farm*
- Generic and specific advice

Outdoor use? (Y / N)

Animal Handling? (Y / N)

Benchmarking with other farms?
- Yes (Y)
- No (N)

Animal Handling? (Y / N)

Outdoor use? (Y / N)

No protocol available

NorWel
- NO
- 20 min/flock
- Benchmarking + within farm*

Aviary transect
- AND
- 20-30 min/flock
- Benchmarking + within farm*

AssureWel
- AND
- 10-15 min
- Benchmarking + within farm*
- Advice upon contact

No protocol available

*compare welfare status of the current flock with previous flocks

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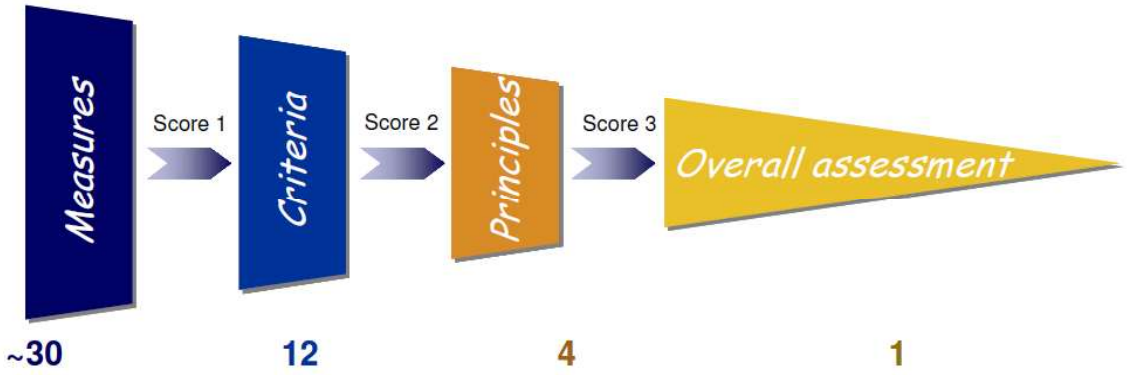
C. AGGREGATING INDICATORS & MONITORING PROTOCOLS: **WQ®**

Welfare Quality® stepwise integration procedure



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C. AGGREGATING INDICATORS & MONITORING PROTOCOLS: **WQ®**

Consumer info

Advice farmer

AW

Principle (0-100)	Criteria (0-100)		Indicators
Good feeding	1.	Absence of prolonged hunger	
	2.	Absence of prolonged thirst	
Good housing	3.	Comfort around resting	
	4.	Thermal comfort	
	5.	Ease of movement	
Good health	6.	Absence of injuries	
	7.	Absence of disease	
	8.	Absence of pain induced by management procedures	
Appropriate behaviour	9.	Expression of social behaviour	
	10.	Expression of other behaviours	
	11.	Good human-animal relationship	
	12.	Positive emotional state	

↘ compensation

↘ expert : layman

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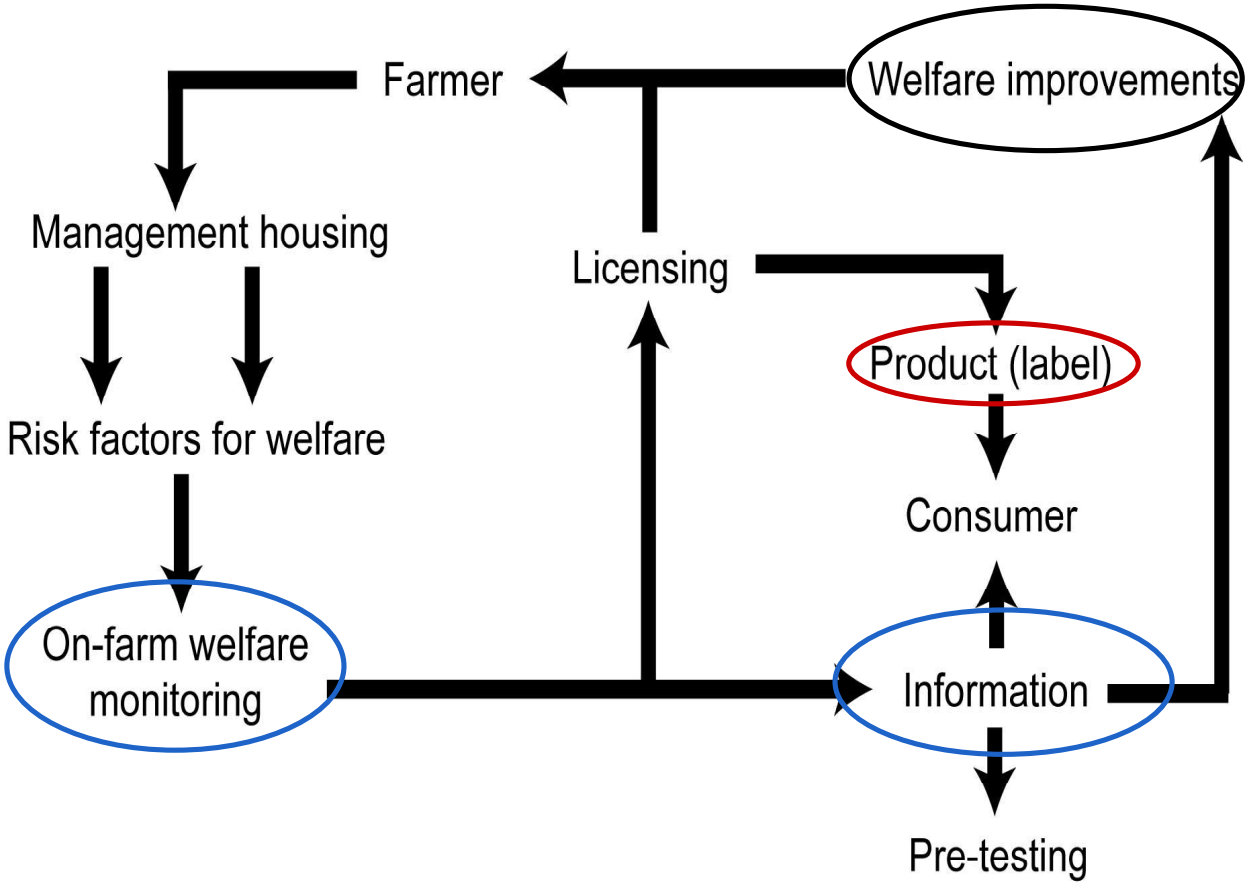
C. AGGREGATING INDICATORS & MONITORING PROTOCOLS: **WQ®**



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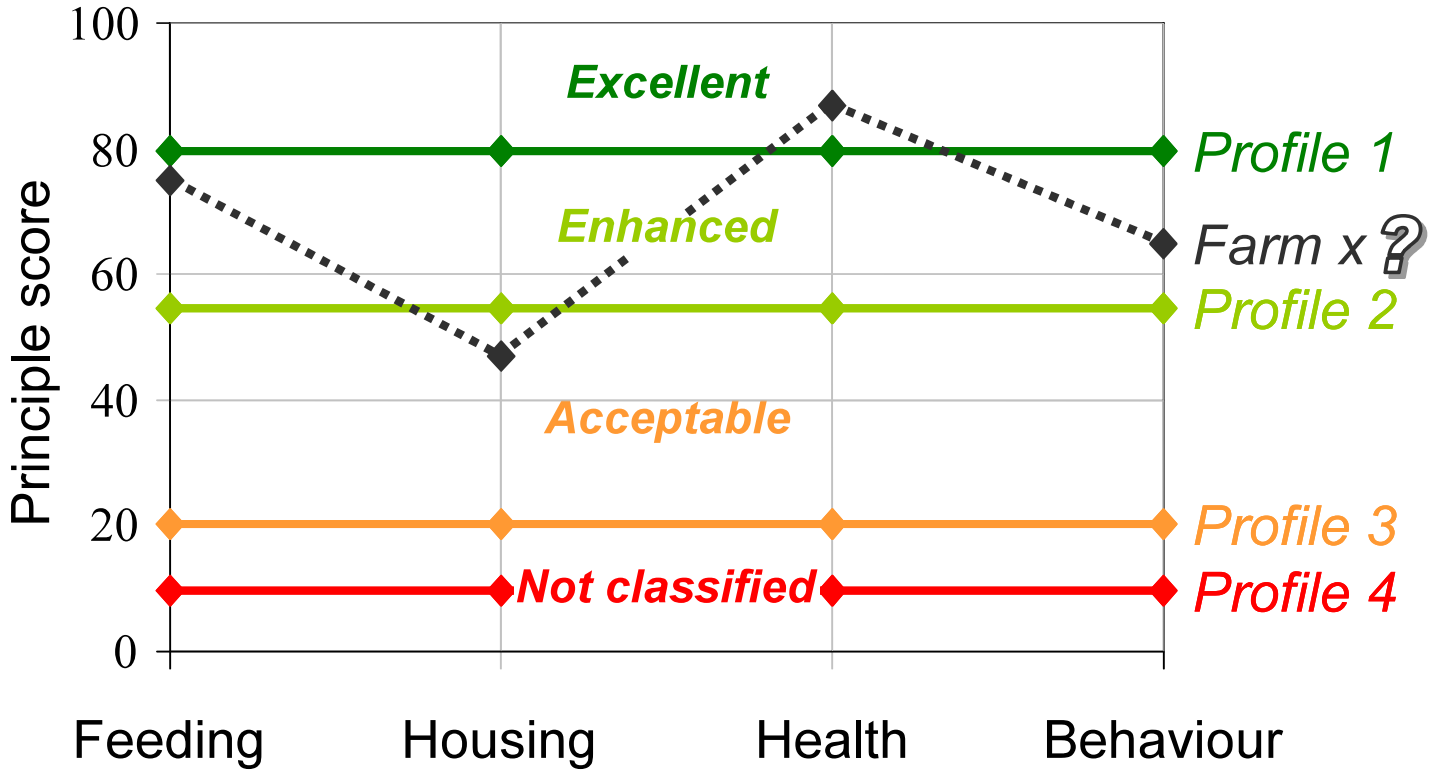
Blokhuis et al (2003)

C. AGGREGATING INDICATORS & MONITORING PROTOCOLS: **WQ®**

Integration: principles → general welfare category



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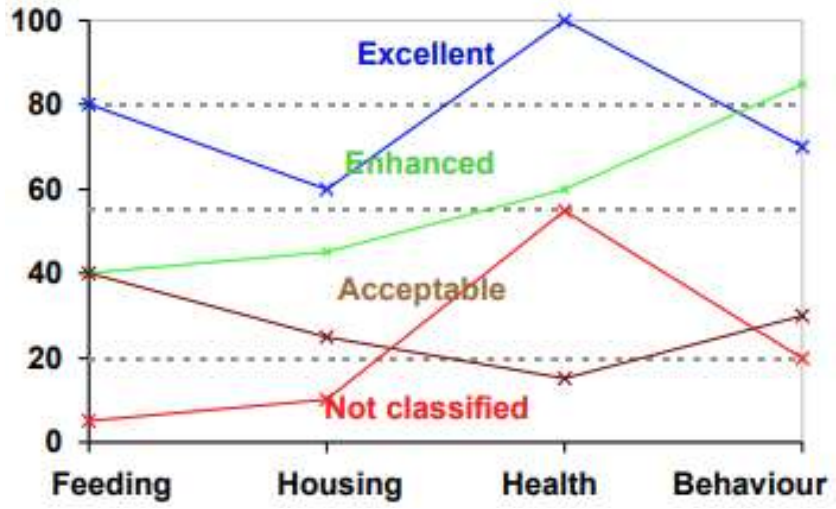
4 Welfare categories



- Excellent: >55 on all principles & >80 on 2 principles
- Enhanced: >20 on all principles & >55 on 2 principles
- Acceptable: >10 on all principles & >20 on 3 principles
- Non-classified: other

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4 categories	Application
1. Excellent welfare	→ Animal welfare label
2. Enhanced welfare	→ General quality label
3. Acceptable welfare	→ minimum standards
4. Not classified	

- All (most) farms can participate
- Encourage improvements (benchmarking)
- Marketing 'top' category

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Label?

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C. AGGREGATING INDICATORS & MONITORING PROTOCOLS: **WQ®**

... still some problems

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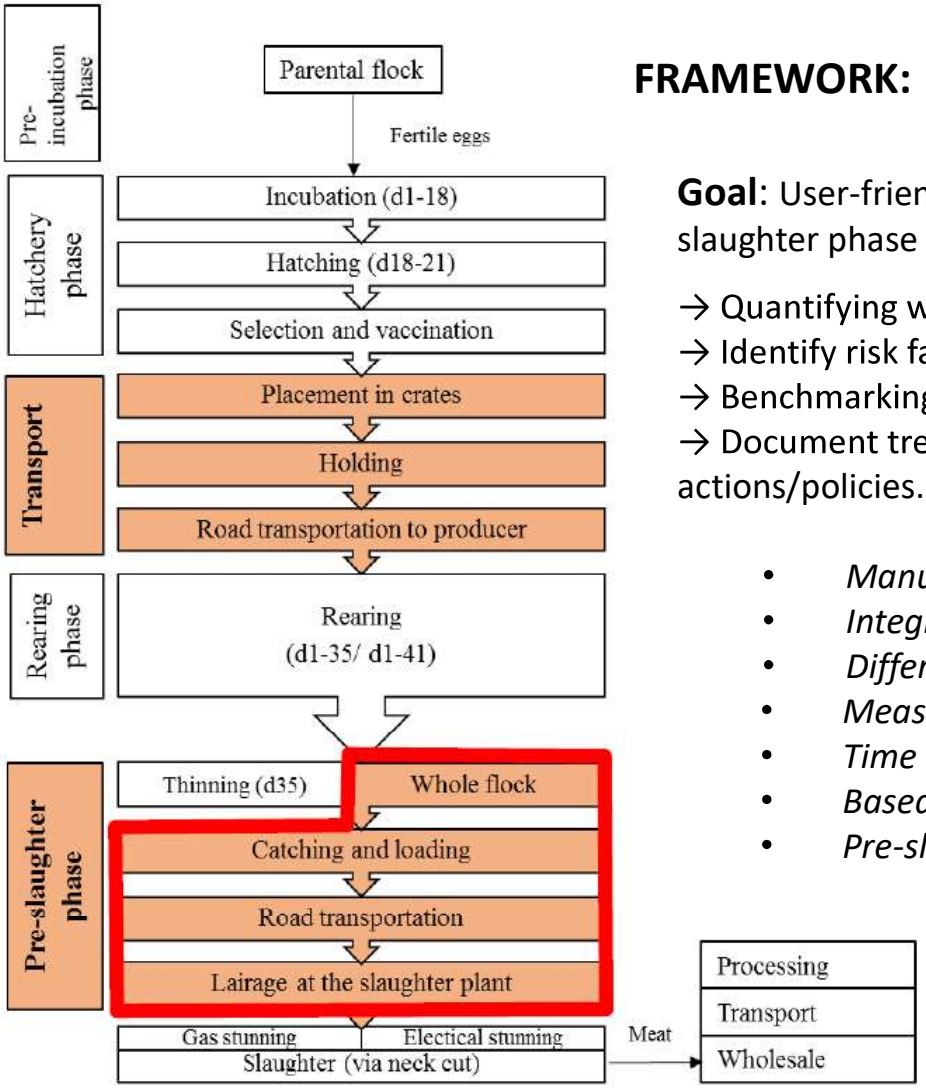
B. ANIMAL WELFARE INDICATORS: **WQ**

Principles	Criteria	Dairy cattle	Growing pigs	Broiler chicken	Laying hen (2.0)
Good feeding	Absence of prolonged hunger	BCS (% very lean animals)	BCS (% lean animals)	Emaciation	Keel bone prominence
	Absence of prolonged thirst	Availability & cleanliness water	Availability & cleanliness water	Drinker space	Availability of water
Good housing	Comfort around resting	Lying down duration; % collisions; on edge of lying area; cleanliness	Bursitis, manure on body	Plumage cleanline… qual., dust sheet t…	…d mites, dust sheet
	Thermal comfort	-	Shivering, panting, huddling	Panting, huddling …	
	Ease of movement	Tethering	Space allowance	Stocking density	Stocking density; horizontal/vertical movement; perforated floors
Good health	Absence of injuries	Lameness; integument alterations	Lameness; body & tail wounds	Lameness; dermatitis;	KBD; skin lesions; FPD; toe/beak damage
	Absence of disease	Respir./reprod./digestive diseases; SCC; dystocia; downer; mortality	Mort; coughs; sneezes; pumping; twisted snouts; rectal prolapse; scouring; skin condition; ruptures & hernias	On-farm mort. & culls; rejections	On-farm mort. & culls; enlarged crops; eye pathol., respir. infections, entiritis, parasites; comb abnorm.
	Absence of pain induced by management procedures	Mutilations (dehorning; tail docking: use of anaesthesia/analgesia)	Castration; tail docking; use of anaesth./analg.)		Beak treatment
Appropr. behav.	Expression of social behaviour	Incidence agonistic interactions	Social behav.		plum. damage back of head; comb pecking wounds
	Expression of other behaviours	Access to pasture	Exploratory behav.	Free range, FR cover	Plum. dam. (back, tail, vent); nest space; litter; enrichment (use), FR (cover), covered veranda; comf. & forag. behav.
	Good human-animal relationship	Avoidance distance at feeding place	Panic response to human walking in pen	Avoidance distance test	Avoidance distance test
	Positive emotional state	QBA	QBA	QBA	Novel object test; QBA

Predict 95% of WQ final categorisation (Buijs et al 2017)

C. AGGREGATING INDICATORS & MONITORING PROTOCOLS: **PRE-SLAUGHTER BROILERS**



FRAMEWORK:

Goal: User-friendly protocol to monitor chicken welfare during pre-slaughter phase in practice

→ Quantifying welfare problems
→ Identify risk factors
→ Benchmarking (catching teams, transporters, slaughterhouses,...)
→ Document trends (evolution over time) and impact (effect of actions/policies...)

- *Manual*
- *Integration to 1 overall welfare score*
- *Differentiate between transports*
- *Measurements only at slaughterhouse*
- *Time & cost-efficient*
- *Based on expert opinion*
- *Pre-slaughter phase: catching - start of slaughter process*

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https://ilvo.vlaanderen.be/uploads/migration/public/Mediatheek/Mededelingen/248_Vleeskippenwelzijn_tijdens_pre_slachtfase_UPDATE.pdf

Selection of indicators

Potential indicators (own expertise & literature)

No	Indicator	Meas. level (unit)
Physical condition		
1	wing[1] or leg fractures	Flock (%)
2	Lesions on Hindquarters	Animal (%)
3	Soiling feathers	Animal (0-3 score)
4	Discharge/ blood in beak, nasal cavities, auditory meatus[2]	Animal (%)
5	Weight loss	Animal (kg)
6	Bruising breast/ wings/ legs[1]	flock (%)
Thermal stress		
7	Body temperature[2]	Animal (°C)
8	Panting/ huddling[1]	Crate (%)
Comfort in crates		
9	Prostration[2]	Crate (%)
10	Splayed legs[3]	Crate (%)
11	Crowding[3]	Crate (%)
12	Supine birds[3]	Crate (%)
13	Stuck toes/ wings/ heads[3]	Crate (%)
Routinely collected data		
14	DOA	Flock (%)
15	Carcass rejections	Flock (%)
Emotional state		
16	Qualitative Behaviour Analysis (QBA)	Flock (score)

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[1] Welfare Quality® (2009)
[2] EFSA (2011)
[3] Visser et al. (2014)

Selection of indicators

Slimming down : criteria to remove indicators

1. Not affected by pre-slaughter (observational study, n=81)

No	Indicator	Meas. level (unit)
Physical condition		
1	wing[1] or leg fractures	Flock (%)
~~2~~	~~Lesions on Hindquarters~~	~~Animal (%)~~
3	Soiling feathers	Animal (0-3 score)
~~4~~	~~Discharge/ blood in beak, nasal cavities, auditory meatus[2]~~	~~Animal (%)~~
5	Weight loss	Animal (kg)
6	Bruising breast/ wings/ legs[1]	flock (%)
Thermal stress		
7	Body temperature[2]	Animal (°C)
8	Panting/ huddling[1]	Crate (%)
Comfort in crates		
~~9~~	~~Prostration[2]~~	~~Crate (%)~~
10	Splayed legs[3]	Crate (%)
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12	Supine birds[3]	Crate (%)
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Routinely collected data		
14	DOA	Flock (%)
15	Carcass rejections	Flock (%)
Emotional state		
16	Qualitative Behaviour Analysis (QBA)	Flock (score)

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Selection of indicators

Slimming down : criteria to remove indicators

1. Not affected by pre-slaughter (observational study)
2. **Low importance according to experts (and time-consuming)**
3. **"Double" indicators → Remove the most time-consuming**

No	Indicator	Meas. level (unit)
Physical condition		
1	wing[1] or leg fractures	Flock (%)
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Routinely collected data		
14	DOA	Flock (%)
15	Carcass rejections	Flock (%)
Emotional state		
16	Qualitative Behaviour Analysis (QBA)	Flock (score)

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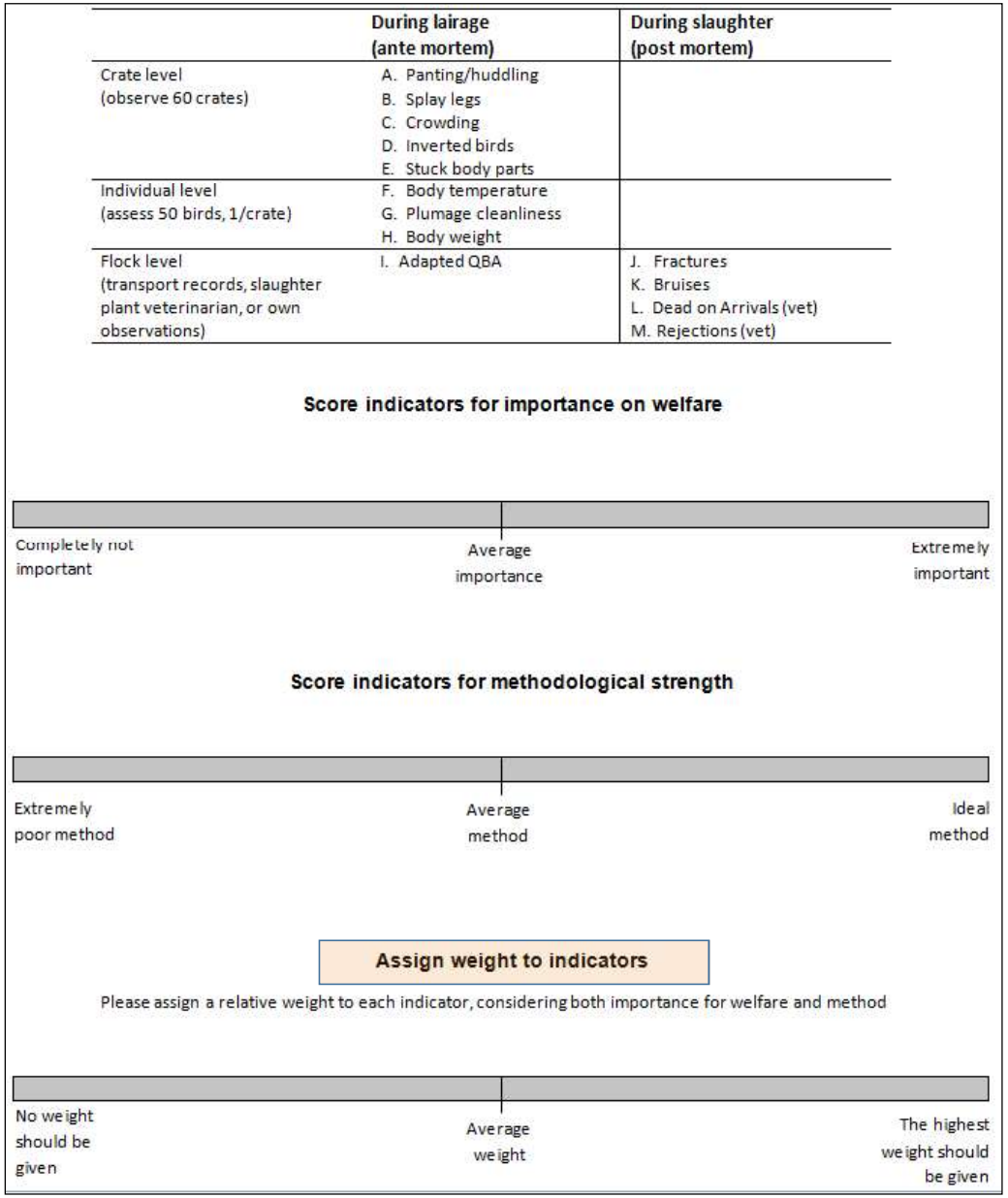
Expert survey

- Workshop during ISAE conference
- 9 poultry experts
  - Importance for welfare of broiler chickens during transport
  - Methodology
  - Relative weight



	During lairage (ante mortem)	During slaughter (post mortem)
Crate level (observe 60 crates)	A. Panting/huddling B. Splay legs C. Crowding D. Inverted birds E. Stuck body parts	
Individual level (assess 50 birds, 1/crate)	F. Body temperature G. Plumage cleanliness H. Body weight	
Flock level (transport records, slaughter plant veterinarian, or own observations)	I. Adapted QBA	J. Fractures K. Bruises L. Dead on Arrivals (vet) M. Rejections (vet)

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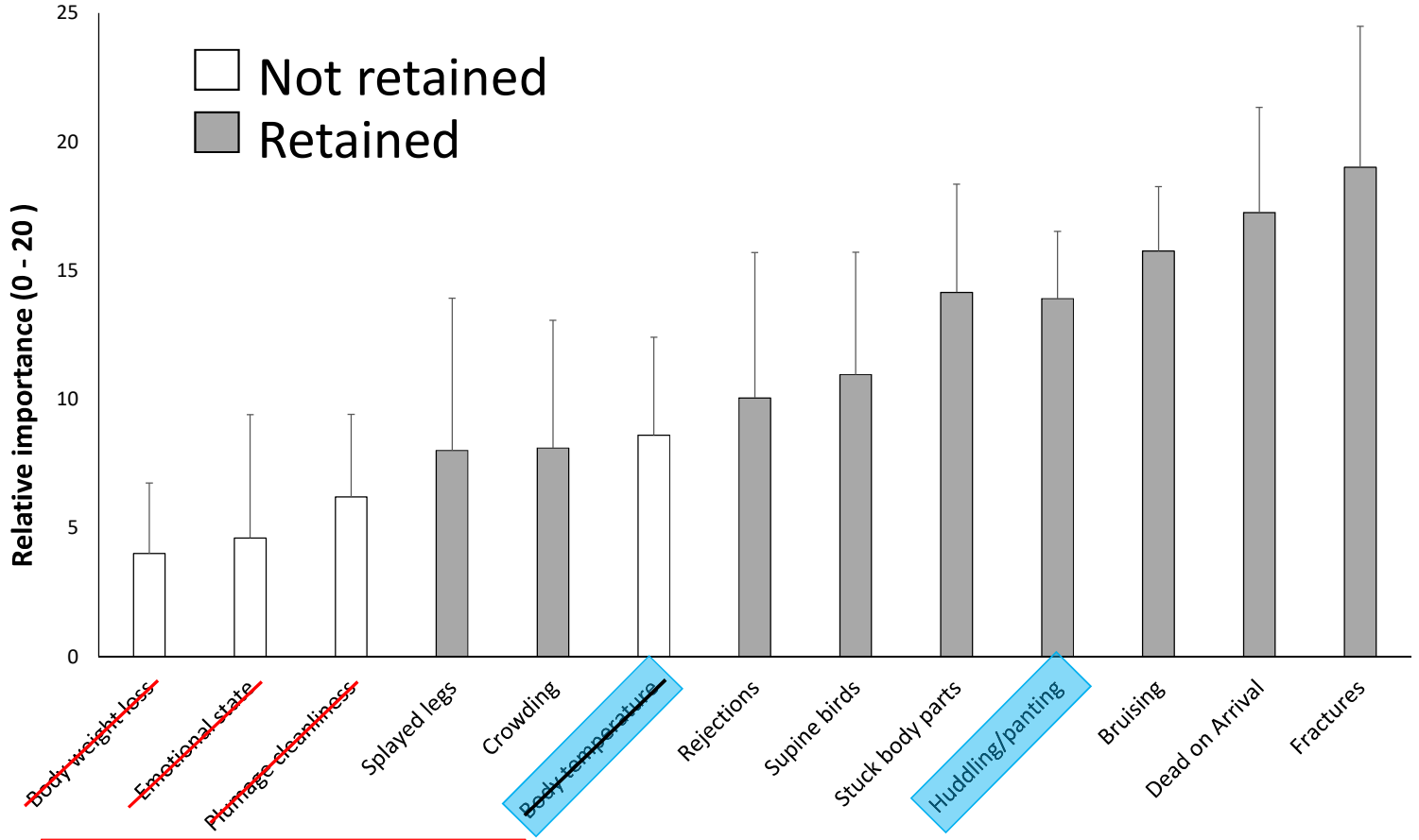
Relative weights (mean of 10 experts)



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Low weight (& time consuming)

Most time consuming "double" removed

Selection of indicators

Slimming down : criteria to remove indicators

1. Not affected by pre-slaughter (observational study)
2. **Low importance according to experts (and time-consuming)**
3. **"Double" indicators → Remove the most time-consuming**

No	Indicator	Meas. level (unit)
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1	wing[1] or leg fractures	Flock (%)
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~~3~~	~~Soiling feathers~~	~~Animal (0-3 score)~~
~~4~~	~~Discharge/ blood in beak, nasal cavities, auditory meatus[2]~~	~~Animal (%)~~
~~5~~	~~Weight loss~~	~~Animal (kg)~~
6	Bruising breast/ wings/ legs[1]	flock (%)
Thermal stress		
~~7~~	~~Body temperature[2]~~	~~Animal (°C)~~
8	Panting/ huddling[1]	Crate (%)
Comfort in crates		
~~9~~	~~Prostration[2]~~	~~Crate (%)~~
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13	Stuck toes/ wings/ heads[3]	Crate (%)
Routinely collected data		
14	DOA	Flock (%)
15	Carcass rejections	Flock (%)
Emotional state		
~~16~~	~~Qualitative Behaviour Analysis (QBA)~~	~~Flock (score)~~

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Selection of indicators

Slimming down : criteria to remove indicators

1. Not affected by pre-slaughter (observational study)
2. Low importance according to experts (and time-consuming)
3. "Double" indicators → Remove the most time-consuming
4. **Check IOR**

No	Indicator	Meas. level (unit)
Physical condition		
1	wing[1] or leg fractures	Flock (%)
~~2~~	~~Lesions on Hindquarters~~	~~Animal (%)~~
~~3~~	~~Soiling feathers~~	~~Animal (0-3 score)~~
~~4~~	~~Discharge/ blood in beak, nasal cavities, auditory meatus[2]~~	~~Animal (%)~~
~~5~~	~~Weight loss~~	~~Animal (kg)~~
6	Bruising breast/ wings/ legs[1]	flock (%)
Thermal stress		
~~7~~	~~Body temperature[2]~~	~~Animal (°C)~~
8	Panting/ huddling[1]	Crate (%)
Comfort in crates		
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13	Stuck toes/ wings/ heads[3]	Crate (%)
Routinely collected data		
14	DOA	Flock (%)
15	Carcass rejections	Flock (%)
Emotional state		
~~16~~	~~Qualitative Behaviour Analysis (QBA)~~	~~Flock (score)~~

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Selection of indicators

Slimming down : criteria to remove indicators

1. Not affected by pre-slaughter (observational study)
2. Low importance according to experts (and time-consuming)
3. "Double" indicators → Remove the most time-consuming
4. **Check IOR**
    - 4 flocks
    - 7 experienced - 1 inexperienced observer
    - ½ day training with pictures, videos, live birds

Panting/Huddling, Splayed legs, Crowding, Supine, Stuck:	>67% agreement
Fractures, bruises (slaughter):	? Sample too small
DOA, Rejections (slaughter):	**? Not known**

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Selection indicators

9 remaining indicators

No	Indicator	Time required (min)
Physical condition		
1	Wing or leg fractures	
2	Bruising breast/ wings/ legs	40
Thermal stress		
3	Panting/ huddling	5
Comfort in crates		
4	Splay legs	
5	Crowding	
6	Supine birds	10
7	Stuck toes/ wings/ heads	
Routinely collected		
8	DOA	5
9	Carcass rejections	

Time reduction

150 min → 60 min per flock

Good selection of indicators?

Focus on physical / health
(less on fear, stress, fatigue,…)

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Aggregation

GOAL: 1 **integrated welfare score** (IWS) per transported flock

$$IWS = \sum_{i=1}^{n} MS * (MS\ weight * Compensation\ Reduction\ Factor)$$

Steps:

Expert opinion (survey 17-19 experts)

1. Convert actual prevalences for each indicator to a '**measure scores**' (that reflect how acceptable a certain prevalence is for chicken welfare on a **0-100 scale**)
2. Determine **relative weights** for each indicator
3. Check need for **compensation reduction**
4. Develop compensation reduction factor that improves the fit with expert opinion

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Aggregation

GOAL: 1 **integrated welfare score** (IWS) per transported flock

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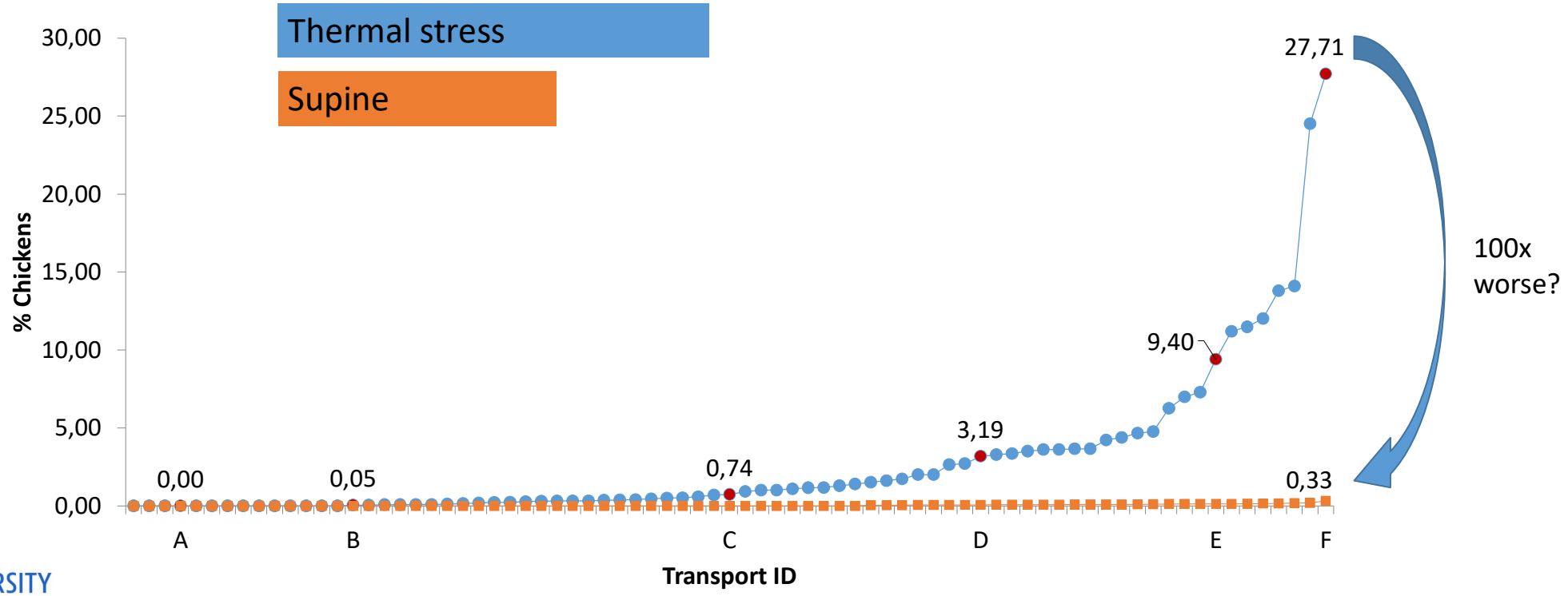
Aggregation

Step 1: prevalences → **measure scores** (0-100)



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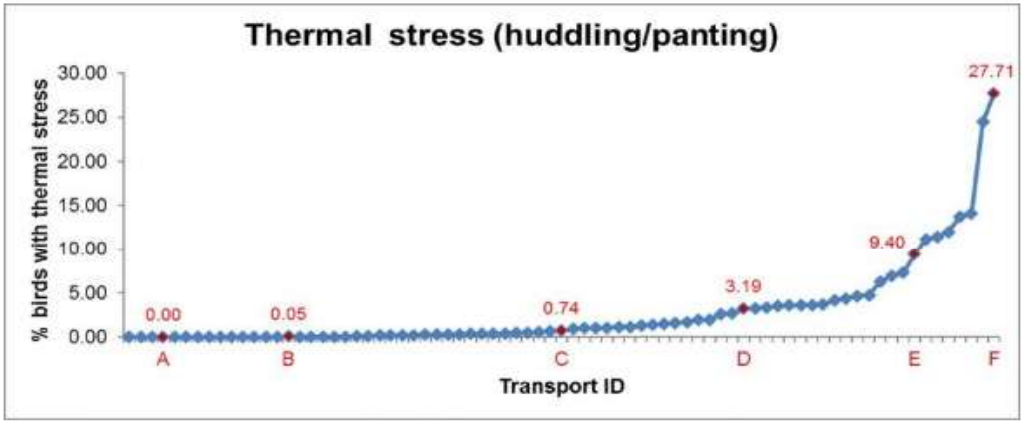
EXPERT SURVEY

- Convert prevalences for transports A-F to 0-100 acceptability scores (similar scale: acceptability of score 80 for one indicator = score 80 for other indicator)
- Median score per prevalence used as input for finding best fitting curves

The figure below shows the % of broiler chickens with signs of thermal stress for 77 commercial transports in Belgium (ranked from the lowest to highest prevalence).

Thermal stress was assessed by the % of birds huddling or panting during lairage.



Please assign a broiler welfare score between 0-100 to each of the transports (A-F), for how acceptable you consider the prevalence for broiler welfare.

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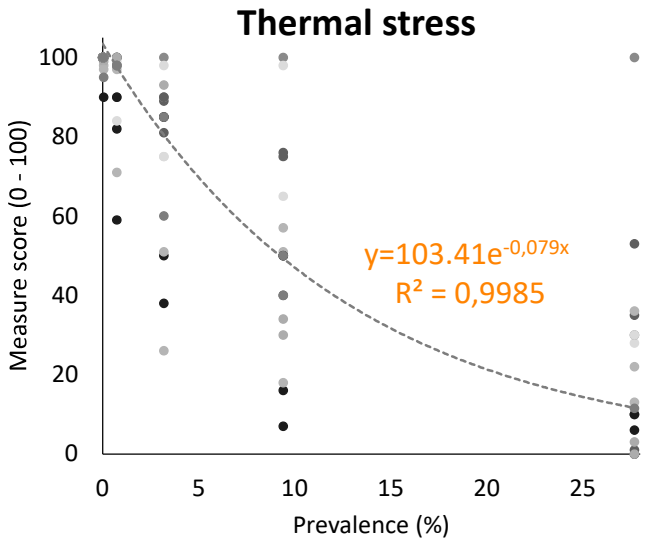
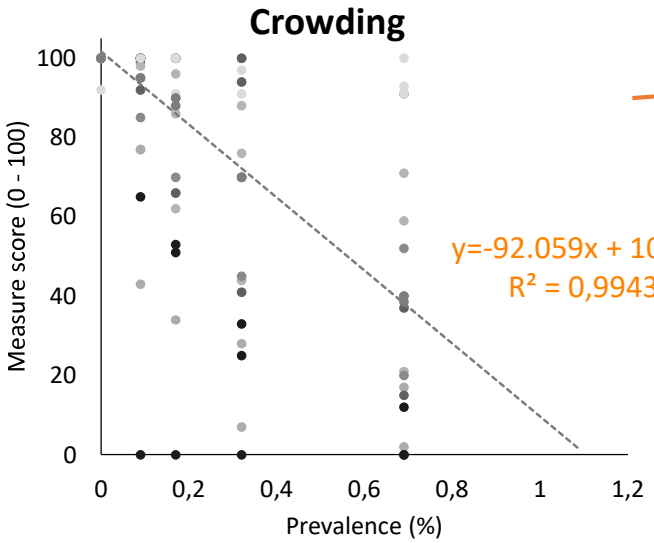
EXPERT SURVEY - RESULTS





Indicator	Formula
% huddling & panting	y=103.41e^-0.079x
% supine birds	y=-196.49x + 104.28
% splay legs	y=102.37e^-1.365x
% crowding	y=-92.059x + 101.68
% stuck body parts	y= -232.73x + 100
% fractures	y= -26.72ln(x) + 45.916
% bruising	y=-31.55ln(x) + 85.93
% DOA	y=-23.69ln(x) + 25.408
% rejections	y=-52.12ln(x) + 88.334

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Aggregation

GOAL: 1 integrated welfare score (IWS) per transported flock

$$IWS = \sum_{i=1}^{n} MS * (MS\ weight * Compensation\ Reduction\ Factor)$$

Steps: Cow language in pictures | Animal Trade Union

Expert opinion (survey 17-19 experts)

1. Convert actual prevalences for each indicator to a '**measure scores**' (that reflect how acceptable a certain prevalence is for chicken welfare on a **0-100 scale**)
2. Determine **relative weights** for each indicator
3. Check need for **compensation reduction**
4. Develop compensation reduction factor that improves the fit with expert opinion

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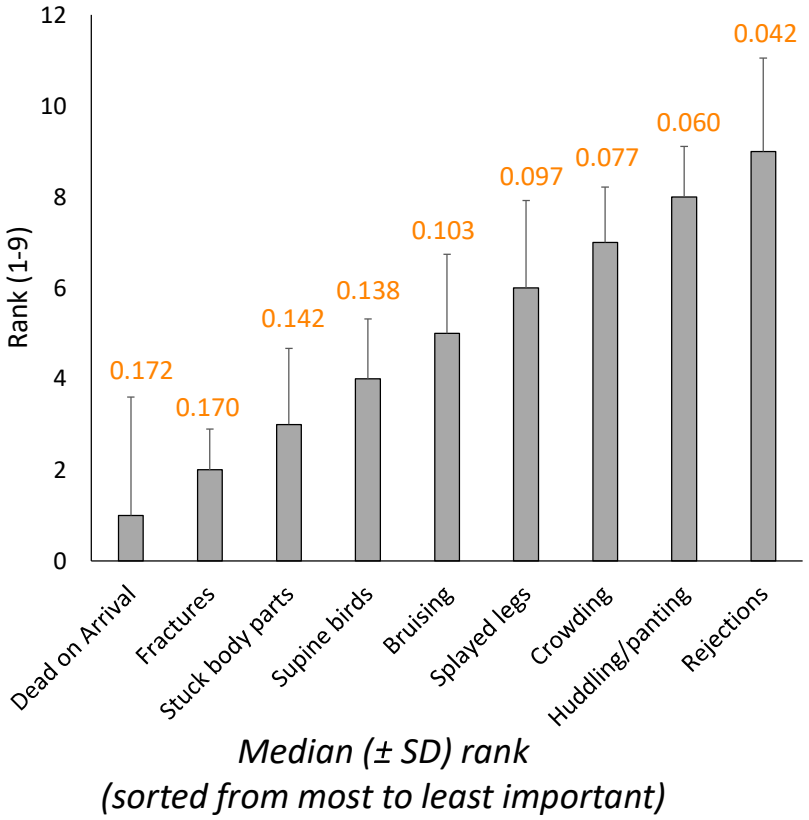
Aggregation

Step 2: Relative weights indicators (0-1)



→ Determines only 4.2% of IWS

(10 - median rank) / sum of all median ranks

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Aggregation

GOAL: 1 **integrated welfare score** (IWS) per transported flock

$$IWS = \sum_{i=1}^{n} MS * (MS\ weight * Compensation\ Reduction\ Factor)$$

Steps: Cow language in pictures | Animal Trade Union

Expert opinion (survey 17-19 experts)

1. Convert actual prevalences for each indicator to a '**measure scores**' (that reflect how acceptable a certain prevalence is for chicken welfare on a **0-100 scale**)
2. Determine **relative weights** for each indicator
3. Check need for **compensation reduction**
4. Develop compensation reduction factor that improves the fit with expert opinion

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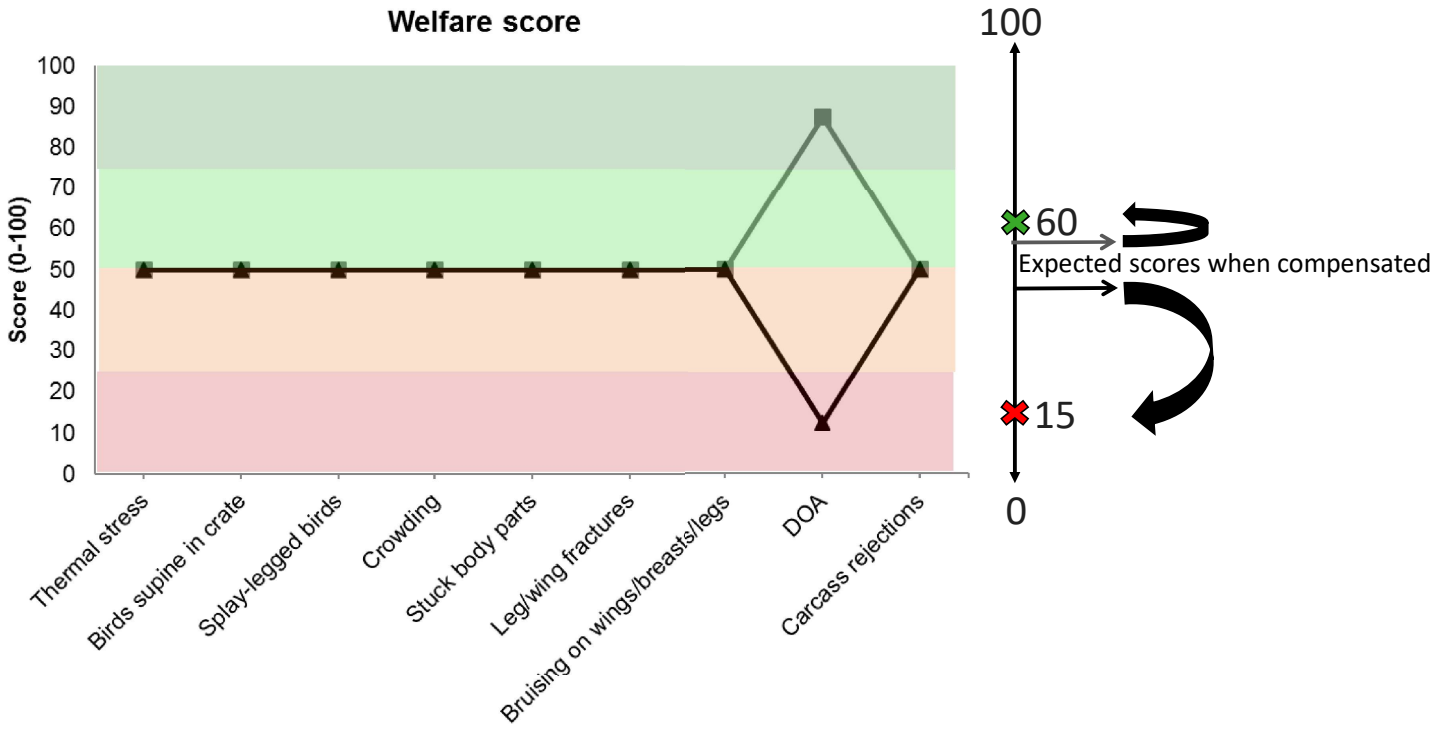
Aggregation

Step 3: Compensation reduction factor

18 experts gave overall welfare score (0-100) for fictitious flocks with 8 neutral + 1 high/low measure score



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→ Experts allocate more weight to **low** vs high scores → **compensation reduction is needed**

Aggregation

Step 3: Compensation reduction factor

$$IWS = \sum_{i=1}^{n} MS * (MS\ weight * Compensation\ Reduction\ Factor)$$

Measure score rank	Compensation reduction weight[1]
9 (low)	0.360
8	0.253
7	0.169
6	0.107
5	0.062
4	0.032
3	0.013
2	0.004
1 (high)	0.0005

Relative more weight for indicators with lowest scores

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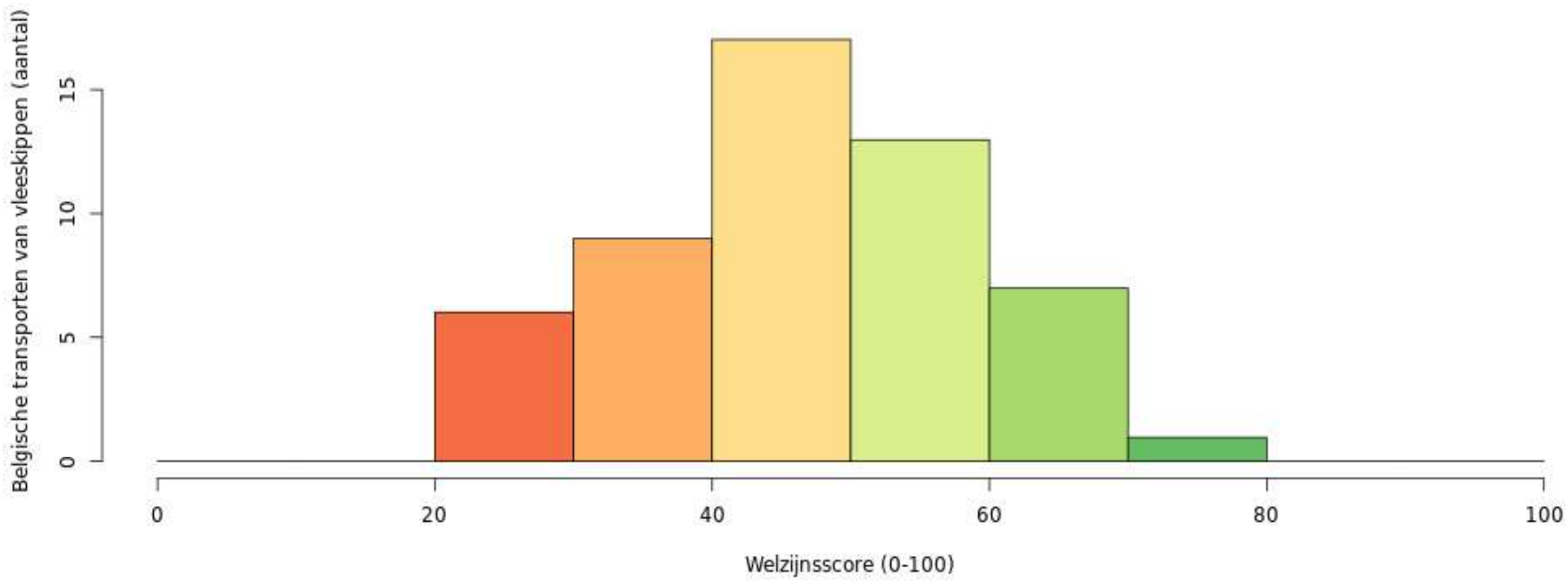
[1] rank measure score (100 - measure score))^3 / sum ((rank measure score (100 - measure score))^3

Differentiation ?

Integrated Welfare Scores for 53 chicken transports in Belgium

$$IWS = \sum_{i=1}^{n} MS * (MS\ weight * Compensation\ Reduction\ Factor)$$



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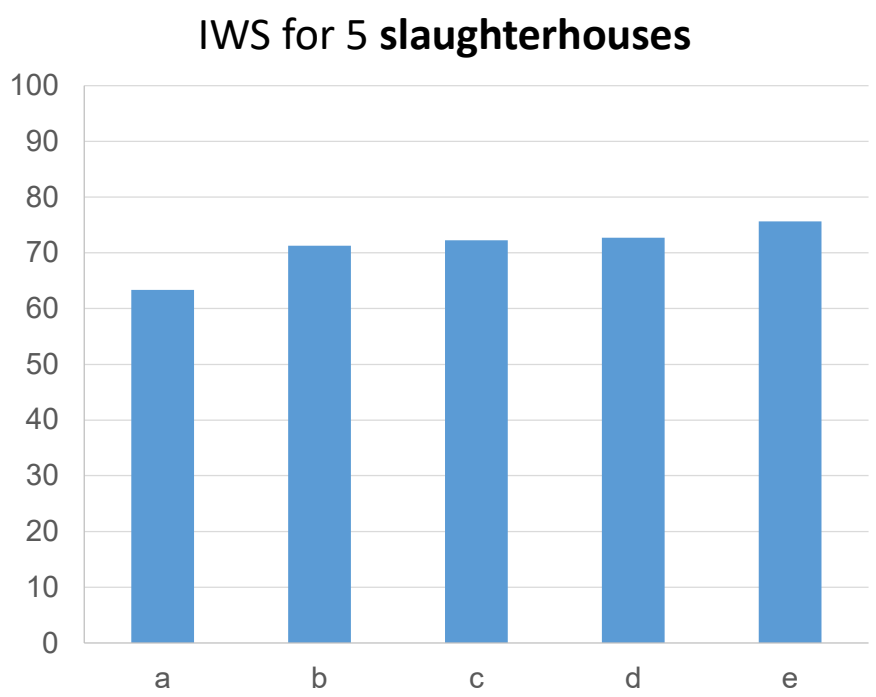
Mean = 46.6 ± 12.5 (range: 20.7 - 70.4)

Applications: comparing slaughterhouses, transport companies, catching teams, farms, assess effect of changes to catching/loading/transport practices, evidence-based governance,....



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Web tool

https://shiny.ilvo.be/Welltrans/

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Input: observed prevalences for the transported flock

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Calculation of measurement scores

	Indicator	Score
1	Thermal stress	95.55
2	Supine birds	6.03
3	Splay-legged birds	51.73
4	Crowding	28.03
5	Stuck body parts	76.73
6	Fractures	78.09
7	Bruising	20.32
8	Dead on Arrivals	8.99
9	Carcass rejections	88.37

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Calculation IWS

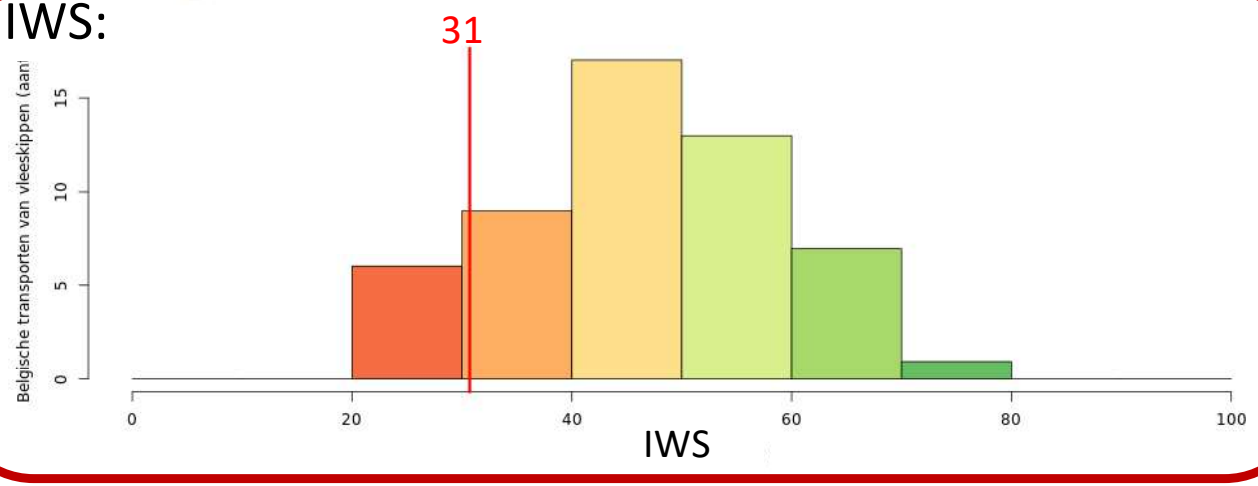
	Indicator	Score
1	Thermal stress	95.55
2	Supine birds	6.83
3	Splay-legged birds	51.73
4	Crowding	28.03
5	Stuck body parts	76.73
6	Fractures	78.09
7	Bruising	28.32
8	Dead on Arrivals	8.99
9	Carcass rejections	88.33

Thermal stress: 1
Supine birds: 0,5
Splay-legged birds: 0,5
Crowding: 0,8
Stuck body parts: 0,1
Wing fractures: 0,2
Leg fractures: 0,1
Bruising on breast and wings: 5
Bruising on legs: 3
Dead on Arrivals: 2
Carcass rejections: 1

Compensation-reduction: lowest scores have biggest impact on IWS

Benchmarking (Belgian flocks)

IWS:



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