

Animal welfare in broilers free-range and organic systems: economic implications at farm level

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Introduction

organic and free-range systems(still) have serious weaknesses

- Increasing demand for poultry meat originating in organic and free-range production systems (ethical and socio-economic and sustainability considerations)
- Welfare challenges concerning organic and non-organic free-range production (infectious diseases, predators and suboptimal use of the outdoor range area)
- Costs incurred by adopting low input production systems are of great importance

Objectives

- Identify a boarder set of promising welfare practices in organic and free-range production systems for broilers
- Sort out the best practices from welfare, ecologic and economic point of view to be practically implemented by the PPILOW project

Methodology

multi-actor approach conducted in nine EU countries (PPILOW Project)

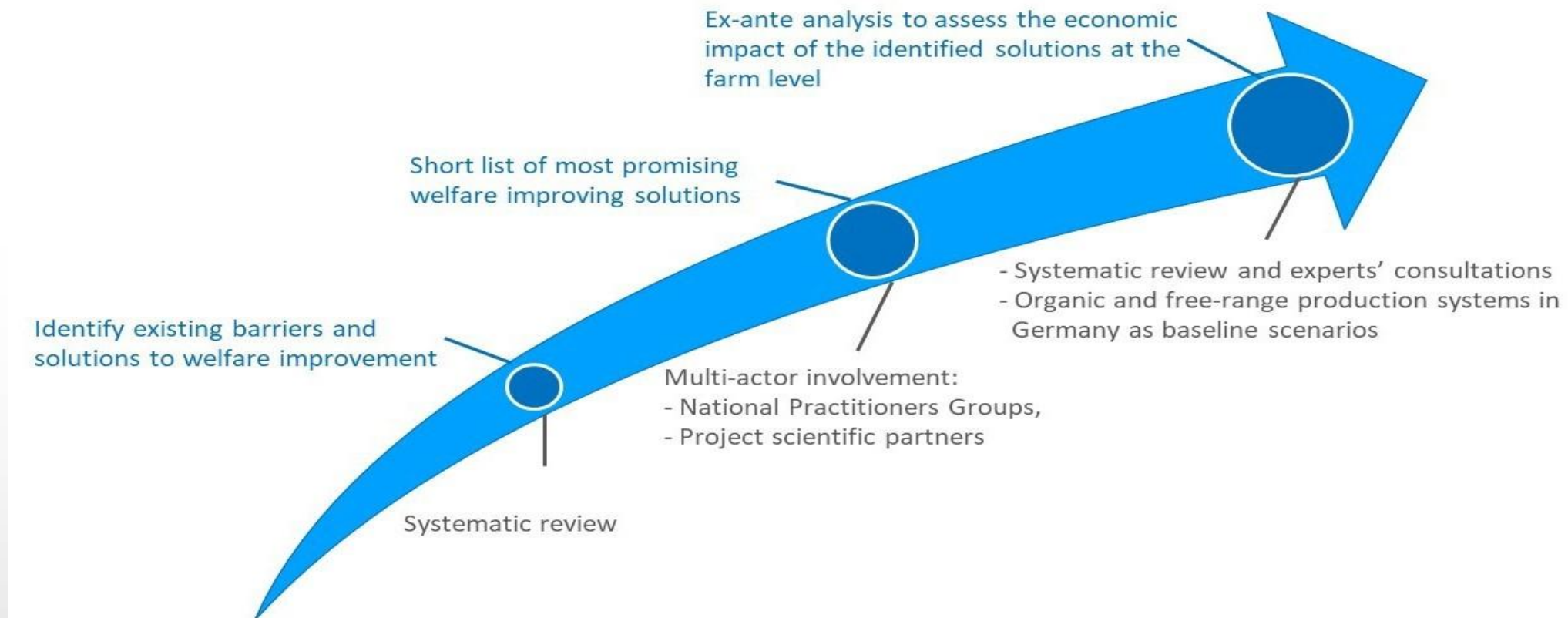
- Proposed welfare improvement solutions to be evaluated in PPILOW project for broiler production in organic and free-range production systems.

Welfare Issue	Type of welfare solution	Solution
Lack of use of the outdoor space	Genetics	Exploiting the genetic variability of exploratory behavior
Challenges of outdoor conditions (temperatures and pathogenic challenges)	Early life management	Stimulation of the adaptive capacities of organic broiler by adjusting early life management

Methodology

multi-actor approach conducted in nine EU countries (PPILOW Project)

■ Steps implemented to investigate and evaluate further welfare improvement practices



Results

systematic review

Welfare Issue	Type of welfare solution	Solution
Transport of one-day old chicks	Early life management	On-farm hatching
Behavior- Nervousness and aggressiveness	Early life management	Incubation light during the entire period of the incubation stage influences adult life
Health: parasitism prevention alternatives to antimicrobials	Biosecurity/health management	Reduce the use of antimicrobials and prevention of parasitism through provision of alternative drugs (probiotics, prebiotics and plant extracts)
Health: alternatives to antimicrobials	Biosecurity/health management	Usage of paper topped with starter feed as alternatives to antimicrobials during the indoor production period of the traditional free-range broiler
Health: leg problems	Nutrition management	Sequential feeding and low protein diet (corn/soya ratio) seem to reduce leg problems.
Health: water quality	Nutrition management	Checking the origin and the content (bacteriological analysis) of the water is a lever.
Health: mortality coping with weather	Outdoor management	Use of mobile house and increase range use by improving the design of the outdoor area with trees and shrubs
Farming management systems	Farmers' training	Link between the fact that the farmer is under contract or not and some welfare indicators of the flock
Unbalanced diets	Farmers' training	Training of the farmer allows limiting this issue.

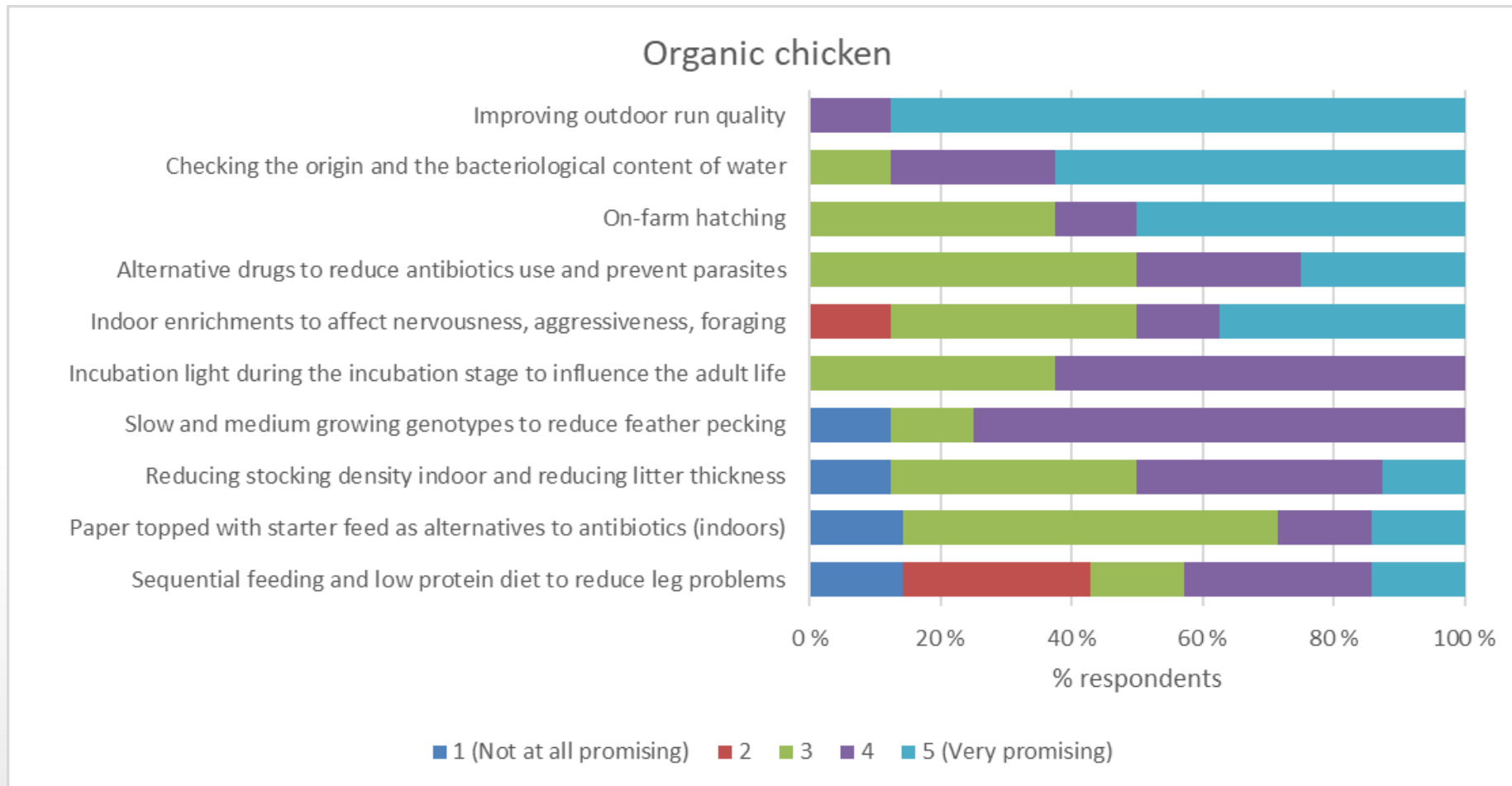
Results

National Practitioner Groups (NPGs)

- Feedback about missed financial, physical and epidemiological data/parameters/ information (data framework organization, dimensions, indicators/criteria)
- Discussion and validation of preliminary results from the economic evaluation (“rough economic scan”): validation of the impact of the levers to the technical parameters
- Discussion on welfare solutions & final list of promising levers:
PPILOW Issues and suggested solutions were addressed by the project NPGs: validation of categories, issues, barriers, levers, solutions by production system and region

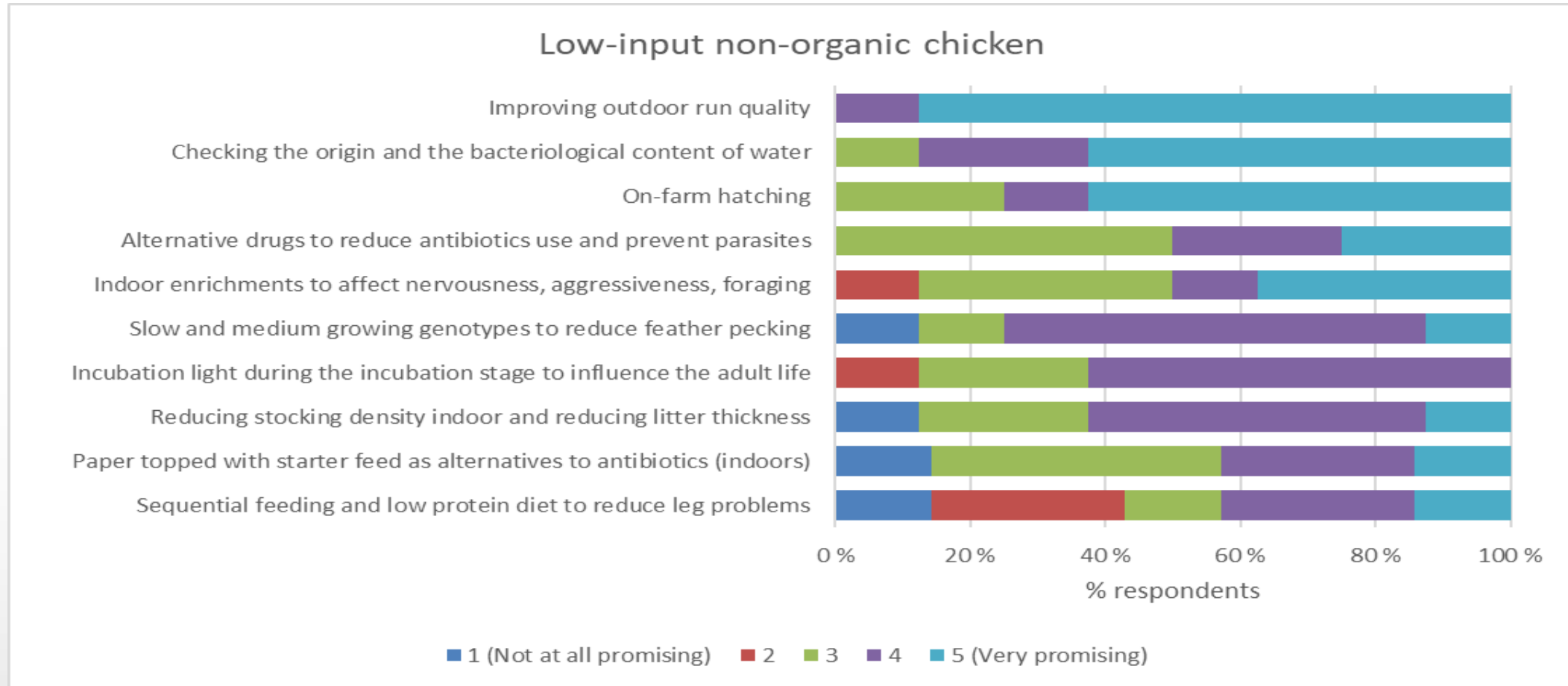
Results

The project scientific partners



Results

The project scientific partners

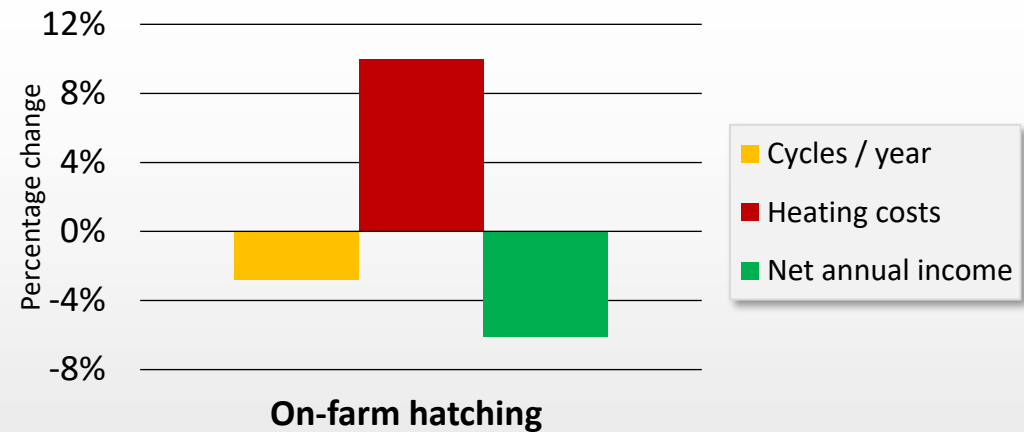
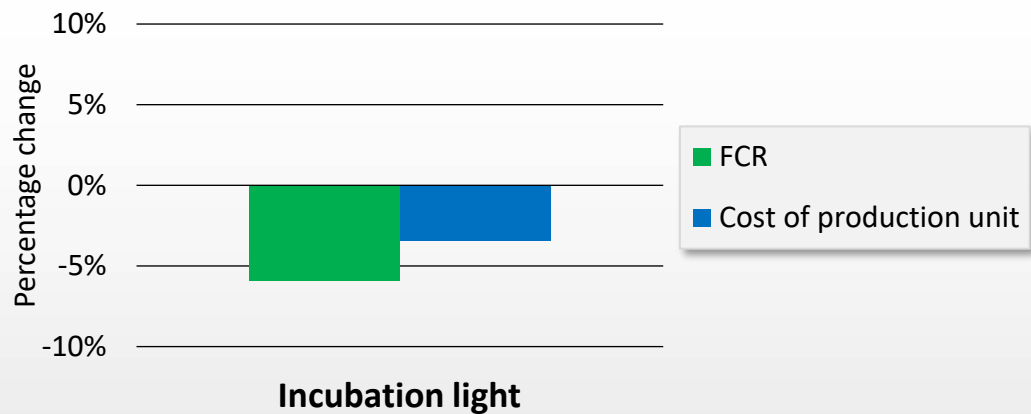


Results

Economic evaluation of most promising welfare solutions

Welfare Issue	Type of welfare solution	Solution
Behavior- Nervousness and aggressiveness	Early life management	Incubation light during the entire period of the incubation stage: → White light-emitting diodes, 12 hours of light / day during the whole incubation period → Low stress hormone corticosterone in eggs and improved immune function later in life → +4.6% higher body weight at the age of 35 days
Stress caused by the transport of one-day old chicks		On-farm hatching → Better navel and hock scores, less foot pad dermatitis → No significant differences regarding FCR and mortality

Estimated impact of welfare solutions on key performance and cost indicators

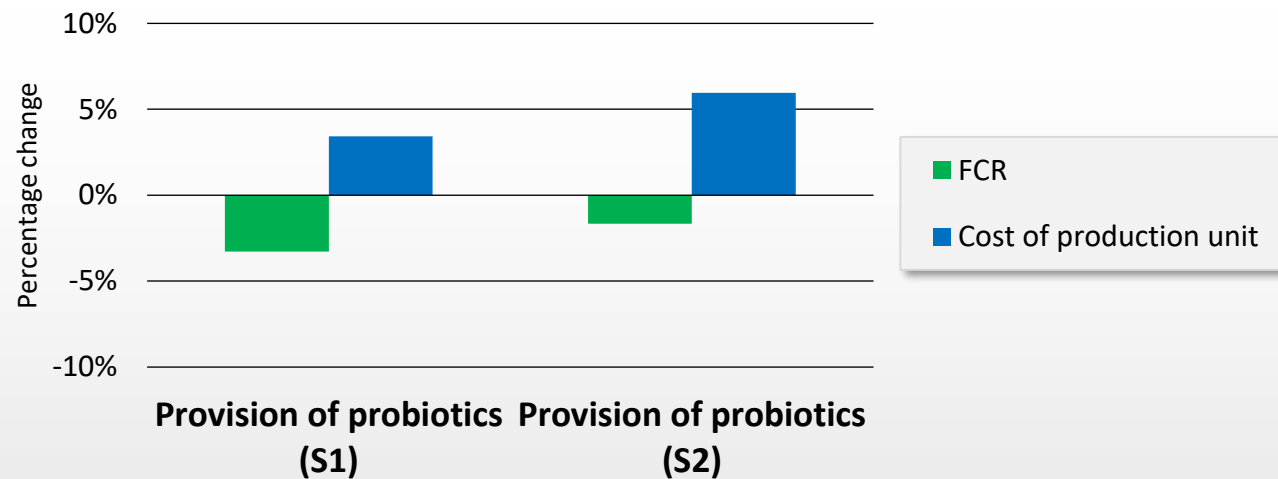


Results

Economic evaluation of most promising welfare solutions

Welfare Issue	Type of welfare solution	Solution
Health: Parasitism prevention Alternatives to antimicrobials	Biosecurity Health management	Probiotics provision → reduce the use of antimicrobials and prevention of parasitism Scenario 1: compound probiotics with Lactobacillus acidophilus and Bacillus subtilis (2×10^5 cfu of probiotic / kg of diet) → +4.81% in final body weight, no change in mortality rate Scenario 2: probiotic of Bacillus subtilis strain DSM 17299 (1.6×10^9 cfu / g of diet) → +1.13% in final body weight, no change in mortality rate

Estimated impact of welfare solutions on key performance and cost indicators



Conclusions (best practices)

- Measures of improving outdoor run quality were identified the most promising.
Despite high labour input, the use of guard animals and improving fences help to limit contacts with predators and wildlife that may transmit pathogens.
- Alternative drugs to reduce the use of antimicrobials and controlling the bacteriological content of the drinking water are highly recommended health and biosecurity measures.
- Incubation light and on-farm hatching were observed as promising measures in terms of early life management practices.

Conclusions (production costs)

- Costs incurred in the implementation of such practices varies considerably between production systems and countries and welfare practices itself.
- Increased production costs, however, can be compensated by
 - Improving productivity (technical performances)
 - additional revenues and gains obtained from product branding.

PPILOW PARTNERS



Thank you for your attention

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Thank you for your attention!



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Results

Economic evaluation of most promising welfare solutions

Welfare Issue	Type of welfare solution	Solution
Health: water quality	Nutrition management	Checking the origin and the content (bacteriological analysis) of the water An automatic purging system with frequent purging or salt electrolysis system

Estimated impact of welfare solutions on key performance and cost indicators

	Scenario A	Scenario B
	Automatic purging system with frequent purging (every 3 hours)	Salt electrolysis system, water chlorine
Performance Indicators		
BW	Higher body weight and better feed conversion ratio due to a better feed nutrients absorption	
Mortality	Decrease in mortality rate due to less water bacteriological contamination (UFC)	
Cost Indicators		
Investment	5 € / animal	416 € / 1000L
Maintenance costs	1.2% of investment	0.11-0.14 € / 1000L / day (ANSES, 2010)
Duration of investment	10 years	10 years

Welfare solution: „Incubation Light“

	Scenario A	Scenario B
Performance Indicators		
Body weight	No change	+4.6%
Feed conversion ratio	No change	-5.9%
Feed intake	No change	-52.4 g feed / bird / cycle
Mortality	No change	No change
Cost Indicators		
Chick price	+10% (45 cent / chick)	+10% (45 cent /chick)
Feed costs	No change	- 3.5 cent / kg liveweight
Other variable costs	+2 cent / kg liveweight	+0.7 cent / kg liveweight
Net income	-2 cent / kg liveweight	+3.8 cent / kg liveweight

Welfare solution: „Incubation Light“

Scenario A: In compliance with Archer et al. (2009), Cobb 500 broiler eggs, obtained from a commercial hatchery, were incubated under 12 hours of light (12L:12D). The intensity of the full-spectrum fluorescent light at the egg level within the incubators was 550 lx. After hatching, birds were raised in floor pens on a regime of 12 hours of light and 12 hours of dark. This scenario did not show any differences in hatchability, mortality, growth, feed consumption, feed conversion ratio compared to the dark incubation (24 hours of light:0 hours of dark).

Scenario B: According to on Riaz et al. (2021), installing white light-emitting diodes (A 250 lx of light from a White LED bulb, 8 watts; cool light, having a temperature of 5000 K) in the incubator and providing for broiler hatching eggs (Hubbard Classic; 58-weeks-old parents) 12 hours of light per day during the whole incubation period improved production results. At the age of 35 days, chicken showed significant differences in body weight and feed conversion ratio compared to the those originating from dark incubation conditions.