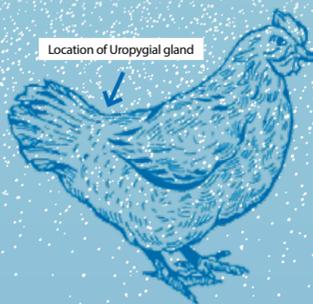


What is SecureChick®?

SecureChick® is a solution of a synthetic analog of the Mother Hen Appeasing Pheromone (MHUSA). In nature, the hen produces that pheromone through the uropygial gland a few days before and after hatching, which makes chicks feel appeased in their first days of life, feeling close to their mother.



The diffusion of SecureChick® comforts the day-old chicks at hatch, allowing a better tolerance to the hatchery stress.

Mode of Action

- The pheromone is detected by the olfactory system, which transmits a message to the brain, inducing specific behavior.
- Studies have demonstrated that odor detection in domestic chickens is already functional two days before hatching, the chick displays behavioral and physiological responses to specific odors.

(Tolhurst and Vince, 1976).



Spraying SecureChick® inside the hatcher surfaces and over eggshells before hatch will:

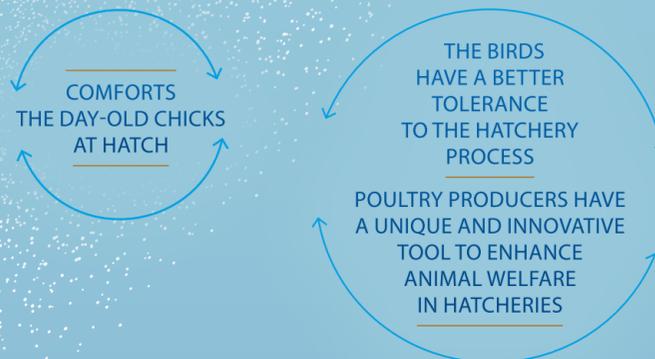
- MIMIC MOTHER HEN CARE,
- RECREATE MOTHER-CHICKEN IMPRINTING, AS CLOSE AS POSSIBLE TO NATURAL CONDITIONS,
- HELP DAY OLD CHICKS TO BE APPEASED WITH NO IMPACT ON VITALITY.

SECURECHICK® helping the chicks during the hatchery process

SecureChick® (MHUSA)

HAS AN APPEASING EFFECT OVER THE BIRD

Advantage & benefits



Administration

- Synthetic analogue of the Mother Hens Uropygial Secretion Pheromone, called MHUSA at 10%, in emulsion form. Presented in 500 ml bottle.
- To be diluted in the same volume of distilled water for preparing the spraying solution. One application from 48 hours before hatch, by spraying over the hatcher surfaces and eggshells of embryonated eggs. Dosage: 20mL for 1,000 eggs / 1 bottle (500 ml) for 25,000 eggs.
- Conservation: Store in a dry place at a temperature between 10°C and 30°C (50°F and 86°F). Avoid freezing. Once the bottle is opened, the entire content must be used within 24 hours.
- Exclusive licence from IRSEA® and double patent rights (composition and hatchery application). Manufactured by Ceva Santé Animale, Loudeac Campus, France.



IRSEA: Institute of Research on Semio-chemistry and Applied Ethology. French private research institute dedicated to the study of the behavior of animals and humans, their interactions and especially their chemical communication.

References:

- Hedlund L, Jensen P (2022) Effects of stress during commercial hatching on growth, egg production and feather pecking in laying hens. PLoS ONE 17(1): e0262307. <https://doi.org/10.1371/journal.pone.0262307>
- Félix Michaud, Pauline Creach, Bruno Brouard, Bruno Gazengel, Simon Laurent, et al.. VOCALISATIONS DU POUSSIN : DEVELOPPEMENT D'UNE METHODE D'ENREGISTREMENT ET D'ANALYSE. Treizièmes Journées de la Recherche Avicole et Palmipèdes à Foie Gras, Mar 2019, Tours, France. fthal-01943407
- Madec, I., J. F. Gabarrou, E. Gaultier, J. Bowen, and P. Pageat. 2008c. Effects of a maternal odorant on innate fear response in domestic chickens (Gallus gallus). Applied Animal Behaviour Science.

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SecureChick®, comforts the birds at hatch allowing them to better tolerate the hatchery process.



SECURECHICK®

MATERNAL PHEROMONE FOR DAY-OLD CHICKS

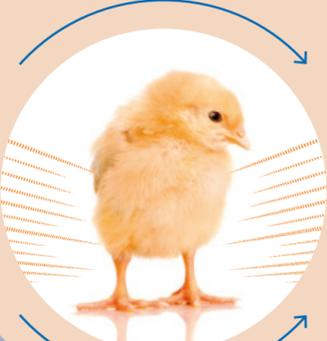


Hatchery practices are stressful for day-old chicks

Commercial hatchery conditions and the absence of the maternal care, are stress factors that can negatively impact the birds' welfare

Maintaining the normal physiological conditions in day-old chicks without causing them stress is a challenging task in today's highly efficient commercial hatchery operations.

The effect of physical stress on day-old chicks



INFLECTED

- ARTIFICIAL HATCHING CONDITIONS
- HIGH POPULATION DENSITY
- FREQUENT MANIPULATIONS
- DELAYED ACCESS TO FEED AND WATER
- NOISY ENVIRONMENT
- LOW NATURAL LIGHT
- SORTING, COUNTING, BOXING
- VACCINATION
- TRANSPORTATION

EFFECT

- FEAR BEHAVIOUR
- SUB-OPTIMAL GROWTH
- UNEVEN RESPONSE TO VACCINATION
- DECREASED INTESTINAL FUNCTION
- DECREASED PRODUCTIVITY
- INCREASED MORBIDITY AND MORTALITY



Birds under stress conditions have limited body resources for growth, response to environmental changes and defense mechanism.

(Rosales, 1994)

Under the stress conditions, there is redistribution of body resources including energy and protein at the cost of decreased growth, reproduction and health.

(Beck, 1991; Brake, 1987)

Swedish researchers have found that stress during commercial hatching affects growth, egg production and feather pecking in laying hens.

(Hedlund L, Jensen P.2022)

SecureChick® proven efficacy in the hatchery!

A large trial showed a positive impact of the sprayed pheromone before hatch, getting a calming effect after hatch.

| Breeder flocks age (Wks old) | Treatment Group* (n=Hatchery baskets) | Eggshell spraying time before hatch (Hours) | | |
|------------------------------|---------------------------------------|---|------|------|
| 40-44 | G-1: Pheromone (n=36) | 72 | | |
| | G-2: Pheromone (n=55) | | 48 | |
| | G-3: Pheromone (n=61) | | | 24 |
| | G-4: No treatment (n=74) | None | None | None |
| | G-5: Placebo (n=77) | 72 | 48 | 24 |

Standard hatchery baskets contained 100 birds.

Effect on behaviour

- Preliminary observations on videos of chicks in hatchery boxes, have demonstrated that the counting of events such as "overall agitation", "move across each other" and "congeners assaults" were statistically different (p<0.001) between the SecureChick® pheromone groups and the non-treated group.
- To confirm this finding, videos from the same study were analyzed by digitalization and artificial intelligence methods such as the Optical Flow methodologies :

PICTURE 1: Extraction of the optical flow at a given moment of time for one video of the experimental sample. The red vectors indicate the direction of the estimated motion of the chicks at a given point of space.



Acknowledgement is made to Mehdi Moussaid, PHD, Researcher at Max Plank Institute Germany for the development of this methodology.

PICTURE 2: Intensity of motion for the same image as presented in picture 1. The yellow areas indicates the places with stronger agitation. The direction of motion is ignored.

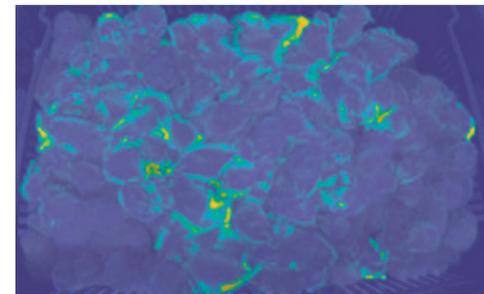
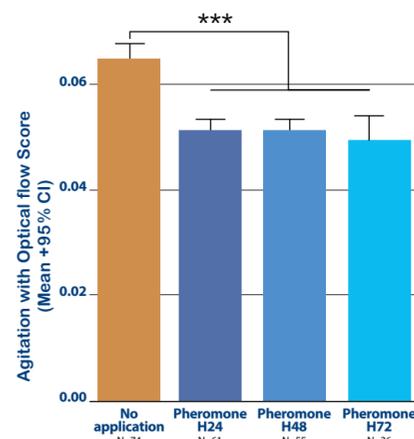


FIGURE 1: Comparison of the SecureChick® pheromone effect on behavior (Optical Flow Methodology)



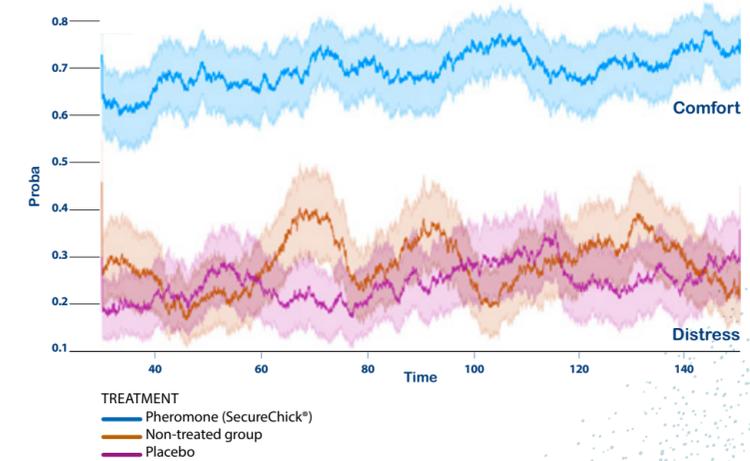
The average agitation reduction for all videos in each treatment group with the pheromone analogue either at 72, 48 or 24 hours were statistically significant (p<0.001), indicating the calming effect of the pheromone regardless the time of application.

SecureChick® HELPS REDUCE AGITATION LEVELS DEMONSTRATING ITS CALMING EFFECT ON THE BIRDS AT HATCH.

Effect on vocalizations

- A scientific publication done by Michaud et al. in 2019 in France, described a method for recording and analyzing chicks vocalizations emitted during the first 3 days of life. Additionally, the study allows the identification of the chicks' comfort and distress vocalizations, through a time-frequency analysis.
- In our study, about 450 audios were analyzed by an algorithm developed internally by the Ceva Data management team, allowing the determination of the probability to find comfort vocalizations in a box of 100 chicks.

FIGURE 2: The probability of finding comfort vocalizations in chicks in boxes.



TREATMENT
 — Pheromone (SecureChick®)
 — Non-treated group
 — Placebo

The graph shows that the probability to hear « comfort vocalizations » is higher (over 50 to 80%) in individuals treated with SecureChick® versus the non treated or placebo groups.

THE APPEASING EFFECT OF SecureChick® IS DEMONSTRATED BY THE MUCH MORE FREQUENT IDENTIFICATION OF COMFORT VOCALIZATIONS IN TREATED BIRDS AT HATCH.

Conclusion



THE METHODOLOGY USED TO MEASURE STRESS AGITATION AND VOCALIZATIONS IN DAY-OLD CHICKS WAS CONSISTENT AND SHOWED THE BENEFICIAL EFFECT OF SECURECHICK® ON CHICKS' ADAPTATION TO THE NEW ENVIRONMENT DURING THE HATCHERY PROCESS.