Technical Sheet for Solution Implementation

Equine Temperature Microchip

Thematic Area: Health and Welfare.

Priority: What practices can be implemented to promote biosecurity measures and prevent emergent diseases?

Need: How to prevent Herpes Virus? What are the biosecurity measures? Biosecurity/ health prevention: how to implement it?

Solution EU Number: HE-01.

Content of the Solution: Integrated temperature sensor in the transponder enables continuous body temperature monitoring.

Key Contacts:

- Vetenarians; Breeding/ registration associations.
- For France:
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Reasons for Implementing this Solution

Facilitating the monitoring of body temperature of equines and fever can be detected early. Affected animals can be isolated quickly to prevent the spread of infectious diseases. Automatic temperature recording replaces manual measurement and reduces effort and stress for animals and staff.

Description of Solution Strategies

The body temperature of horses can be measured intramuscularly or via the nuchal ligament using a transponder equipped with an integrated temperature sensor. Two systems are currently available on the European market:

- **Thermochip®** (MSD Animal Health): A combined transponder for identification and temperature monitoring, implanted in the nuchal ligament. It is marketed in several EU countries, including Belgium, France, Germany and Spain.
- **Fever Check CT®** (Atria/Realtrace): Available either as a combined transponder (identification + temperature) for implantation in the nuchal ligament or as a temperature-only sensor for intramuscular use, typically in the pectoral muscles. Currently, it is mainly distributed in France.

Both systems are the same size and shape as conventional identification transponders. Temperature readings can be taken manually using a reader or automatically via a reader placed in a collar or at a point of interest such as a water trough.

The transponders are made of biocompatible glass or polymer that has been specially developed to prevent rejection or allergic reactions. They are about the size of a grain of rice and are implanted using a cannula - usually in the nuchal ligament (ligamentum nuchae).

They are passive RFID devices that do not require electricity and only emit a signal when read by an appropriate reader.

Pay attention:

1) The main obstacle to its use at present is the lack of any study measuring the reliability (sensitivity and specificity) of this measurement for detecting hyperthermia. European regulations prohibit the double chipping of equines for identification.

2) We are not aware of any software that can automatically alert the horse keeper if the curve is exceeded. The Fever check transponder reader determines a reference temperature from the first 5 values read. The result on the screen shows the difference in relation to this reference temperature range.

Implementation Steps

1. **Consult a veterinarian or identification professional.**
   - Before proceeding, seek guidance from a veterinarian and/or the person authorized to perform equine identification to choose the appropriate transponder type and implantation site.

2. **Implant the transponder**
   - For **combined transponders** (identification + temperature), implantation should be done during the official identification process (usually in the nuchal ligament).
   - For **temperature-only transponders**, implantation can be performed at any point in the horse's life, typically in muscle tissue such as the pectorals.

3. **Establish individual temperature baselines**
   - Record temperature data for each horse at different times of day and under various conditions (e.g., resting, exercise, transport, housing type, weather). This helps create a personalized reference curve to interpret future readings. Indeed, there is high inter-individual variations, daily variations (1°C/Auclair) and variations according to Tamb/wind/solar radiation. That's why this step is important.

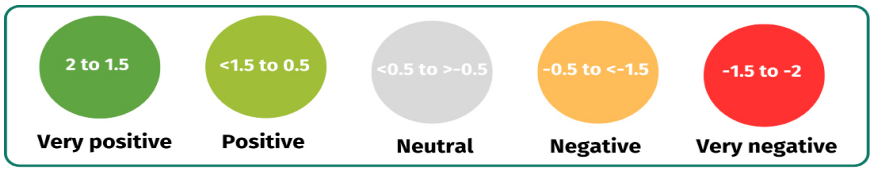
4. **Regularly monitor temperature**
   - Use manual or automatic readers to check temperature consistently. If a reading falls outside the horse's normal range, confirm or rule out hyperthermia by taking a rectal temperature.

5. **Respond appropriately**
   - If hyperthermia is confirmed, isolate the animal and follow veterinary guidance to prevent potential disease spread within the herd.

Equine Temperature Microchip

How Will this Solution Impact the Performance of your Farm ?

TOPIC	SCORE
Social	2.00
Economics	1.00
Welfare	0.50
Health	1.00
Environmental	0
Land access and management	0
Global	0.75



Socioeconomics: This solution will support the social performance of the farm because it enhances safety during temperature monitoring, reduces stress for foals, and improves working conditions, especially in large or sport horse farms. And it's good for the image of the farm to use a system to prevent health issues.

This solution will support the economic performance of the farm because it saves time and is cost-effective, with only a slight additional cost per unit (€1 to €2), which is not a barrier to adoption. And it can help to prevent health issues with major economic consequences.

Health & Welfare: This solution will have a positive impact on the farm's health performance by enabling early detection of increased body temperature in horses due to ongoing infection, allowing for quicker and more effective veterinary intervention. By improving healthcare, the solution positively affects equine farm welfare performance.

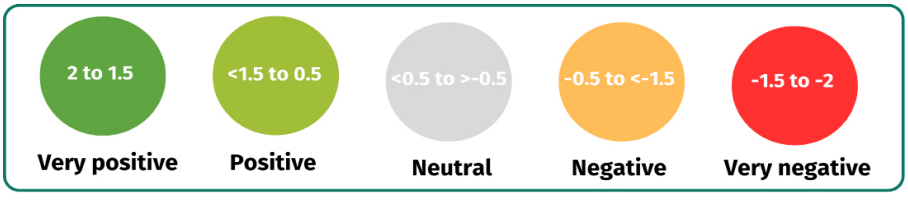
Equine Temperature Microchip

How Will this Solution Impact the Performance of your Farm?

Environmental Sustainability: This solution will not have effect on the environmental performance of the farm because it does not have a direct effect on farm performance related to environmental sustainability. The farmer can pay attention to choosing transponders that have been manufactured using environmentally friendly and take account production, transport and disposal of the product. This solution will not have effect on the land access or management performance of your farm because it does not have direct impact on land access or management.

How Will this Solution Impact the Resilience of your Farm?

TOPIC	SCORE
Social	0.67
Economics	0.42
Welfare	0.08
Health	0.92
Environmental	0
Land access and management	0.33
Global	0.38



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How Will this Solution Impact the Resilience of your Farm?

Socioeconomics: This solution could support social performance of the farm facing external challenges assessed because it reduces staff dependency and supports continuity during absences.

This solution will not impact economic performance of the farm facing external challenges assessed because the benefits of reduced labor needs and drugs are counterbalanced by the cost of additional infrastructure, such as extra boxes for isolation and extra material.

Health & Welfare: When the farm faces external challenges, its health performance will be supported by this solution, as it contributes to the prevention of infectious disease transmission in all type of challenges encountered. So it can help to reduce the consequences of the external challenges assessed on health criteria , by reducing the use of drugs and reducing pain and mortality.

Similarly, this solution does not directly enhance the welfare performance of the farm facing external challenges. Increased disease resilience by frequent reading of body temperature does not necessarily translate into an improved emotional state for the horses or better living conditions.

Environmental Sustainability: This solution will not impact environmental performance of the farm facing external challenges assessed because there is no direct effect on biodiversity, carbon footprint or water quality and consumption.

This solution will not impact land access or management performance of the farm facing external challenges assessed because there is no direct impact on it.

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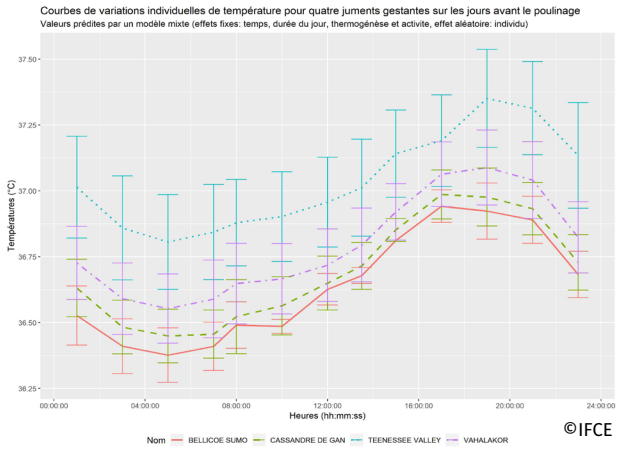

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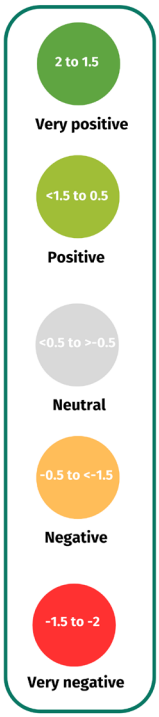
How Can this Solution Help your Farm Cope with Specific External Challenges to Become More Resilient?

CHALLENGES	SCORE
Inflation	0.50
Pandemic	0.33
High welfare standards	0.33
High infectious diseases	0.75
Extreme weather event	0.16
Loss or limited access to grassland	0.08



Inflation & Social Crises: This solution could support global performance of the farm facing inflation because it helps to reduce labor needs and vet bills.
This solution will not impact the global performance of the farm facing pandemics because while it helps maintain efficiency with fewer staff, its contribution to overall resilience during widespread health emergencies remains limited.

Welfare & Diseases: This solution will support the global performance of the farm **across all three areas** when facing **infectious disease challenges**. It contributes to reduction of pain, mortality rate, disease or injury rate and curative medication by frequent readings of body temperature of the horse, allowing quick reaction of the farmer when the temperature rises. So the farm may stay more resilient confronted with this challenge.
Despite its usefulness for detecting health problems, this solution may not contribute to the farm's global performance when adapting to compulsory high welfare standards.

Climate Change & Access to Land: This solution will not impact the global performance of the farm facing extreme weather events or loss of lands.

So this solution could particularly help the farm to face inflation and infectious diseases.

Equine Temperature Microchip

Cost-Benefit Analysis

Costs

Socioeconomics:

- **Acquisition costs for transponders with temperature sensor**: Higher than for conventional identification transponders. (Approx. 10-20 € surcharge per transponder, depending on model and provider).
- **Acquisition costs for readers**
  - Manual readers: approx. 200-600€
  - Automated reading systems (e.g. in the watering area, collars): several hundred to thousands of euros, depending on the scope of the system.
- **Training and instruction costs:** Time or costs for staff training may be incurred, especially for automated systems.
- **Maintenance & technical support:** Software updates, calibration, repair or replacement of readers.

Health & Welfare:

- **Implantation is an invasive procedure:** Even if it is performed routinely, implanting a transponder is a minor procedure with potential risks such as local reactions, pain or infection - especially if the technique or hygiene is not optimal.

Benefits

- **Time saving and efficiency:** Automated or manual temperature measurement with a transponder saves time compared to the conventional rectal method. One person is sufficient for the measurement without the animal having to be restrained.
- **Safer for staff:** Lower risk of injury during temperature measurement, especially with nervous or young horses and in stressful situations.
- **Less staff required:** Particularly beneficial for large farms or events with many animals.
- **Reduction of incorrect measurements:** No incorrect readings due to incorrect positioning of the thermometer.
- **Economic benefits through early detection:** Faster diagnosis and treatment reduce veterinary costs and possible loss of income due to illness.

- **Non-invasive measurement:** No penetration into the body = significantly less stressful, especially for young animals and sensitive horses.
- **Early detection of fever:** Enables faster treatment and isolation of sick animals → better chances of recovery and less suffering.

Equine Temperature Microchip

Cost-Benefit Analysis

Costs

Health & Welfare:

- **Incorrect placement can lead to discomfort:** If implanted incorrectly, e.g. too deep, too shallow or in unsuitable muscle tissue, the implant can cause pressure, irritation or restricted movement.
- **Inadequate temperature monitoring can lead to delayed reactions:** If the temperature is only read irregularly or incorrectly, there is a risk that hyperthermia will be detected too late. This can lead to prolonged suffering or protracted illness.
- **Risk of incorrect data if used improperly:** Incorrect implantation site or insufficient data frequency can lead to unreliable results → Possible follow-up costs due to misdiagnosis or unnecessary measures.

Environmental Sustainability:

- **Electronic devices = consumption of raw materials:** Production and disposal of transponders and readers consume resources (plastics, electronics, batteries if necessary).
- **Energy consumption for automatic reading:** Power consumption, e.g. for continuous operation of stationary readers (e.g. for drinking troughs or stall access).

Benefits

- **Detection of health changes:** Supports diagnosis e.g. infectious diseases, exercise stress, heat stress or effectiveness of fever-reducing medication.
- **Support in birth monitoring:** Studies show a correlation between temperature changes and impending foaling.

- **Reduced material consumption compared to disposable thermometers:** Transponders are durable and usually only need to be implanted once, which reduces the need for consumables in the long term.
- **Potential for more resource-efficient management:** Early detection of diseases means that treatments can be more targeted and efficient - with potentially less use of medication and energy (e.g. for transportation, isolation, etc.).

Cost-Benefit Analysis

Costs

Environmental Sustainability:

Cooperation between farms:

- **Costs for cooperative use of readout systems:** Joint use of automated systems (e.g. at tournaments or collective stables) requires clear agreements and possibly joint financing.

Benefits

Note: Direct ecological sustainability effects (e.g. energy or emission savings) have so far been limited with the use of temperature transponders, but could increase in the long term through a combination with networked herd monitoring and digital management systems.

- **Early warning system for events or herd contacts:** Faster response to potential outbreaks.
- **Promotes joint prevention strategies:** Standardized monitoring facilitates cooperation, e.g. between training centers, breeding farms and transporters.
- **Technological basis for future networking:** Ideal for networked herd monitoring at larger events or organizations.

Additional Resources

Websites

- https://www.msd-tiergesundheit.de/tierarten/pferd/thermochips-pferde/

Publications

- Auclair-Ronzaud J, Benoist S, Dubois C, Frejaville M, Jousset T, Jaffrézic F, Wimel L, Chavatte-Palmer P. (2020): No-Contact Microchip Monitoring of Body Temperature in Yearling Horses. Journal of Equine Veterinary Science (2020), doi: https://doi.org/10.1016/j.jevs.2019.102892.
- Robinson TR, Hussey SB, Hill AE, Heckendorf CC, Stricklin JB, Traub-Dargatz JL. Comparison of temperature readings from a percutaneous thermal sensing microchip with temperature readings from a digital rectal thermometer in equids. J Am Vet Med Assoc. 2008 Aug 15;233(4):613-7. DOI: 10.2460/javma.233.4.613

Further Information

- Infobroschüre https://www.msd-tiergesundheit.de/wp-content/uploads/sites/53/2022/06/Thermochips-Pferde-Mehr-als-eine-Nummer-MSD-Tiergesundheit.pdf

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Annex

Ideas to Ideas to Animate a Workshop about the Solution

- Ask a producer companies of temperature transponders to sponsor the workshop.
- Find a reference company with practical experience (show video interviews in advance if necessary).
- Complete the required tasks and let the participants take part in these demonstration tasks so that they can get to know the system, for example in small groups go through various stations (implantation, readout, data evaluation, troubleshooting).

Proposed structure for the workshop on: Use of temperature transponders for health monitoring in horses

1. Introduction to the solution: Temperature transponders for horses
- What are transponders with a temperature sensor?
- Where and how are they used in horses?
- Currently available systems (e.g. Thermochip®, FeverCheck CT®).
- Different implantation sites (nuchal ligament, pectoral muscles).

2. Advantages for horse farms
- Stress-free temperature measurement without rectal thermometer.
- Greater safety for staff.
- Time saving and automation potential.
- Early detection of diseases.
- Support for management decisions (e.g. training, foaling).

3. Practical Applications on Horse Farms
- Double use: for identification registration and temperature measurement.
- Direct implementation for foal registration.
- Combination with automated reading systems (drinkers, collars).
- Integration into existing stock management systems.

4. Choosing the most suitable system
- What type of transponder? Temperature only vs. combination (identification + temperature).
- Implantation strategy in operation.
- Compatibility with existing readers or software.
- Advice from a vet or specialist advisor.

5. Hands-On Demonstration
- Live implantation on a model (e.g. horse phantom or video).
- Reading with various reading devices (manual, stationary, mobile).
- Demonstration of automatic reading points (e.g. at a drinking trough).
- Documenting and evaluating temperature curves.

6. Maintenance and Troubleshooting
- Maintenance and calibration of readers.
- Sources of error during reading.
- What to do in the event of failure, incorrect readings or damaged transponders?

7. Case Studies and Real-World Examples
- Presentation of companies that already use the technology.
- What successes/problems have there been?
- What has changed in everyday barn life?

8. Cost Analysis and Return on Investment (ROI)
- Costs for transponders, readers, implantation.
- Savings through faster detection, less working time, fewer disease outbreaks.
- ROI calculation based on examples (e.g. 10-horse stable vs. breeding farm).

9. Q&A Session
- Participants can contribute their specific questions and experiences.
- Discussion about possible applications, reservations and ideas for improvement.

10. Wrap-Up & Resources
- Distribution of information material, links to manufacturers, literature.
- Information on funding or discounts from partners.
- Invitation to participate in pilot projects or network groups.