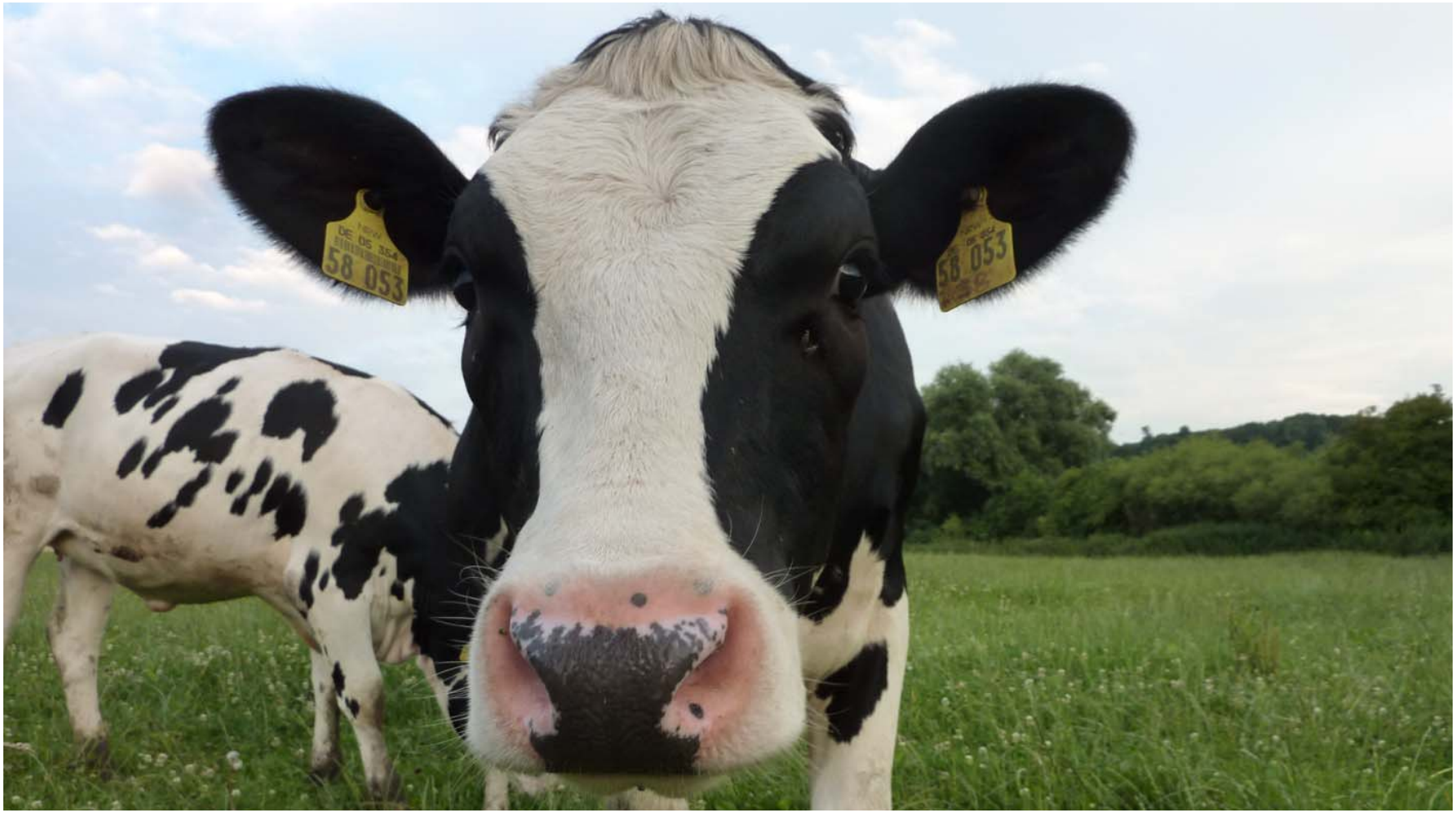


ICAR test of permanent plastic ear tags
- Conventional and EID tags -

Dipl.-Ing. agr. Susanne Gäckler, DLG test center, Germany

Why testing ear tags?

- to check performance and reliability with regard to animal´s useful life and to environmental conditions
- to protect farmers and animals from poor quality products and high retention rates subsequently
- to assure tamperproofness and non-reusability in terms of backtraceability
- to protect animals´ and consumers´ health (harmful substances in plastics)
- to standardize requirements internationally

The role of ICAR in international tag testing

- **Certification body** for conventional and electronic ear tags, boluses and injectables worldwide
- **harmonization of** the **requirements** for ear tags and other ID devices
- development of test procedures taking into account international needs and requirements
- cooperation with the International Standardization Organisation (ISO)
- **registration authority** for RFID devices according to ISO 24631-1

Accredited and ICAR approved laboratories:

- CETIM, France: ICAR laboratory test for conventional ear tags
- DLG test center, Germany: ICAR laboratory test for conventional ear tags; RFID conformance and performance tests (ISO 24631-1 and 24631-3)
- IMA Wageningen, Netherlands: RFID conformance and performance tests (ISO 24631-1 and 24631-3)

Conventional ear tags

1. Preliminary assessment

Aim

- qualifying ear tags for more expensive and time consuming laboratory test

Content

- application test – locking ear tags with and without ears
- tamperproofness – axial and transverse tensile test at high temperature (80 °C)
- breaking forces – tensile test at ambient temperature
- animal welfare requirements – tag design

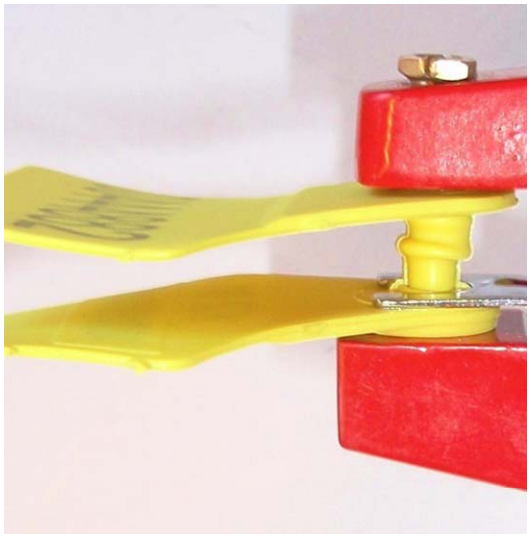
Test performed by Ole Hansen, RYK, Denmark (ICAR approved technician)

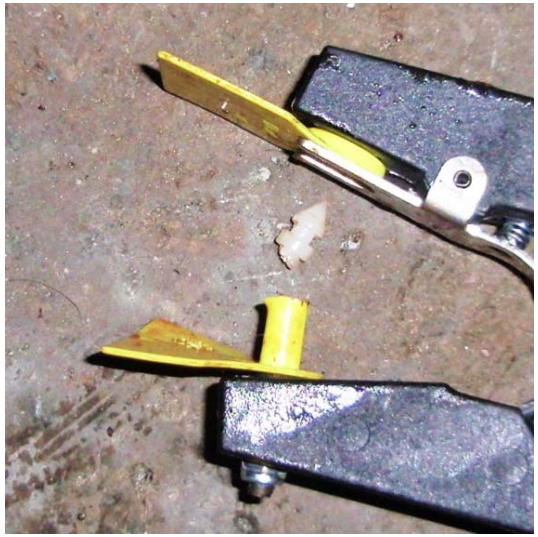
Tensile tests

- axial tensile test at ambient temperature (21 °C)
  → requirement: min. 250 N
- axial tensile test at high temperature (80 °C)
  → requirement: min. 150 N
- transverse tensile test at high temperature (80 °C)
  → requirement: unlocking/ breakage without possibility to re-use

Failure reasons

- ear tags and pliers don´t fit together
- breakage or deformation of the tags/ tag´s pin during application
- unlocking without breakage in the tensile tests
- blocked rotation of assembled tag parts





2. Technical evaluation (laboratory test)

Aim

- evaluation of material properties
- efficiency of visual animal identification
- potential effects on animal and human health

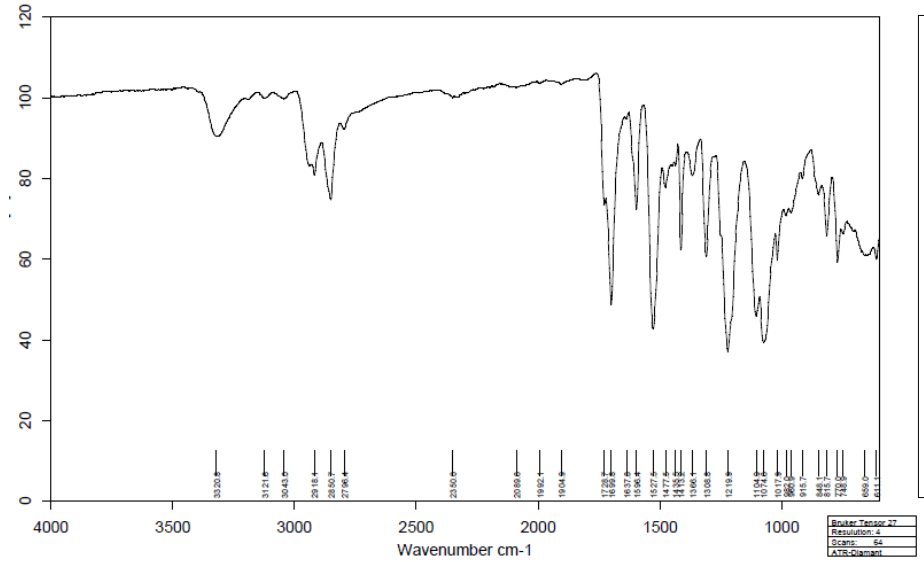
Content

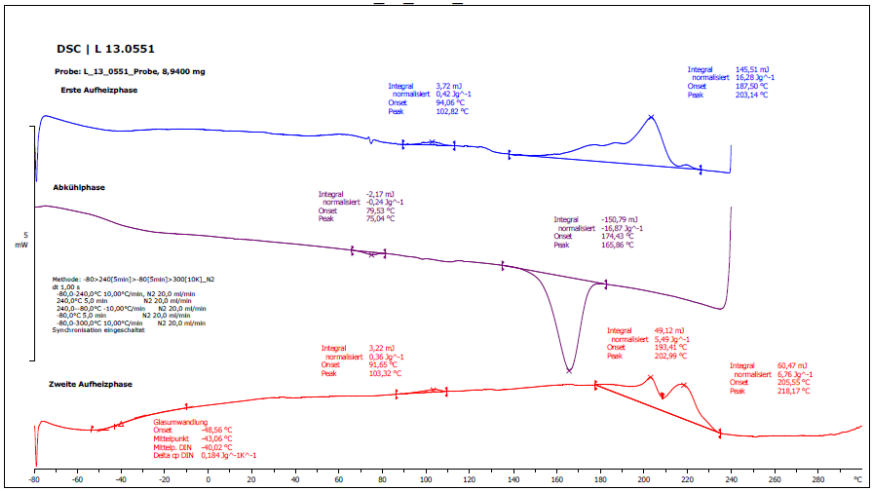
- chemical analysis of plastic composition
- artificial ageing
- breaking forces

  → tensile test at -23 °C, +23 °C and +45 °C
- visual and machine readability
- animal welfare requirements

Composition of the plastic used

- determining of the basic plastic material by ATR-FTIR spectroscopy
  → specific (mostly TPU) spectrum as a basis for later comparisons
- „finger print“: determining of thermal characteristics by DSC analysis
  → melting point and glass transition as recipe specific (unique) values
- analysis of harmful substances: heavy metals, plasticizers, PAH





Artificial ageing

- simulation of 7-10 years outdoor use in continental climate
- process 1: **UV irradiation and rain**, 7 weeks (ISO 4892-2)
- process 2: **damp heat and cold**, 3 weeks (ISO 4611)
- additionally:
  abrasion of new and aged tags by abrasive wheels

Afterwards:

- tensile test regarding resistance of the locking system
- readability tests of (laser) printings

Tensile tests

Conditions

- performed with pre-tempered ear tags (-23 °C, +23 °C, +45 °C)
- three test groups: new, UV/rain aged, damp heat/cold aged
- application of axial tensile strength
- speed rate of tensiometer: 500 mm/min

Requirements

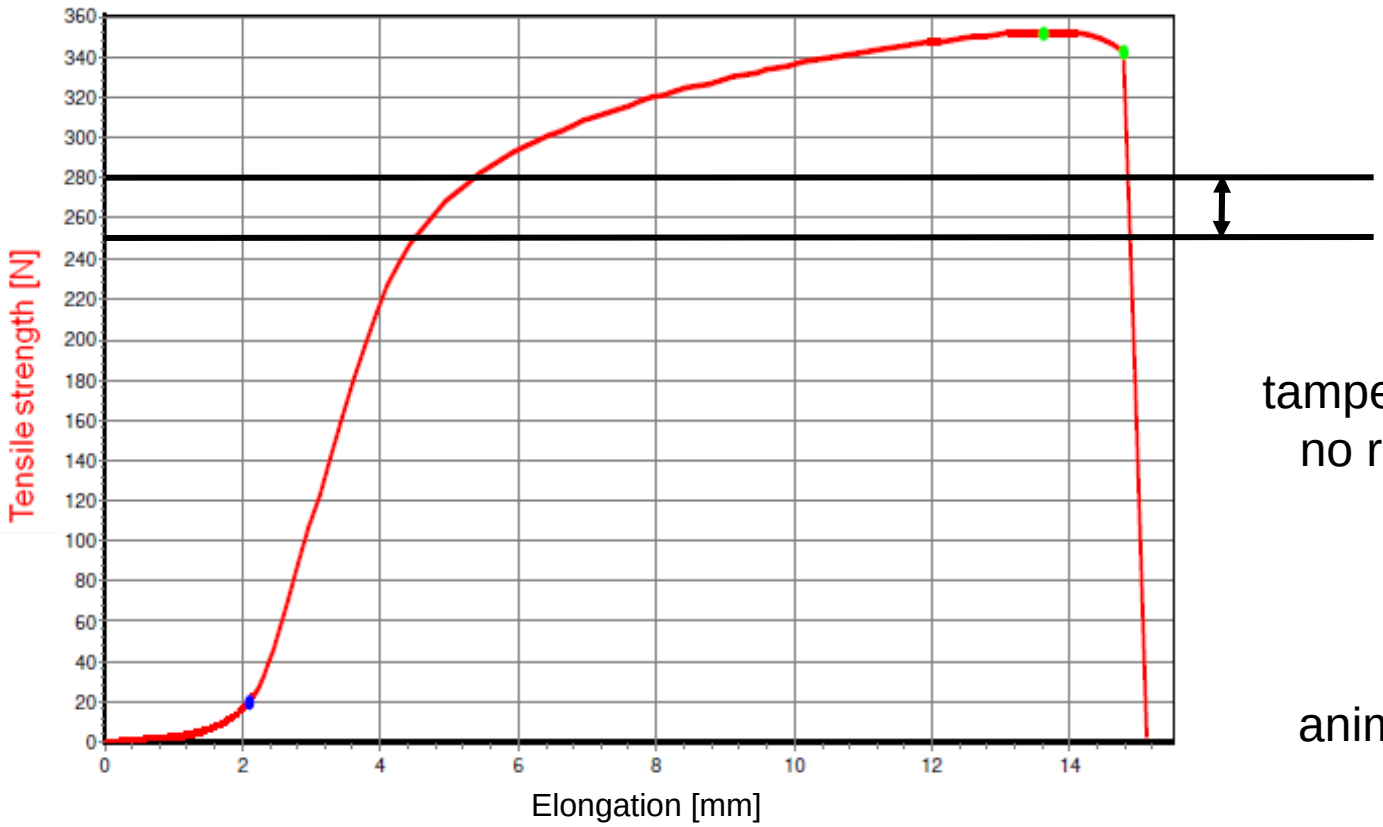
- min. 280 N for new tags at +23 °C
- min. 250 N for aged tags at +23 °C

Additionally in future:

- max. 30 % difference of extension at break between new and aged tags
- own limits for sheep/goat ear tags?

Tensile tests

Resistance of the locking system:



minimum resistance according to ICAR guidelines

tamperproofness,
no re-usability

animal welfare

Visual readability

- assessment of typography:
  → evaluation of reading distances with new and aged (UV/rain, abrased) ear tags compared to paper

Additionally in future:

- evaluation of color contrast change of tag plates and printings; comparison of new and aged ear tags using the grey scale

Requirements

- new tags min. 80 % compared to paper
- aged and abrased tags min. 65 % compared to paper

Machine readability

Optional test!

- scanning barcodes of all treatment and test groups by a supplied barcode reader
  → requirement: max. 3 scans per tag
- scanning new and aged (UV/rain, damp heat/cold, abrased) tags with barcode verifier
  → requirements: PCS min. 60 %, „Pass“ for traditional parameters „message format“ and „dimension of data“

In future replaced by:

- scanning of barcodes by three different barcode readers supplied by laboratory
- ISO-conform barcode verifying of only new ear tags

Electronic ear tags

EID environmental tests

Aim

- evaluation of material properties
- combination with efficiency of electronic identification
- potential effects on animal and human health

Content

- chemical analysis of plastic composition

Stability tests:

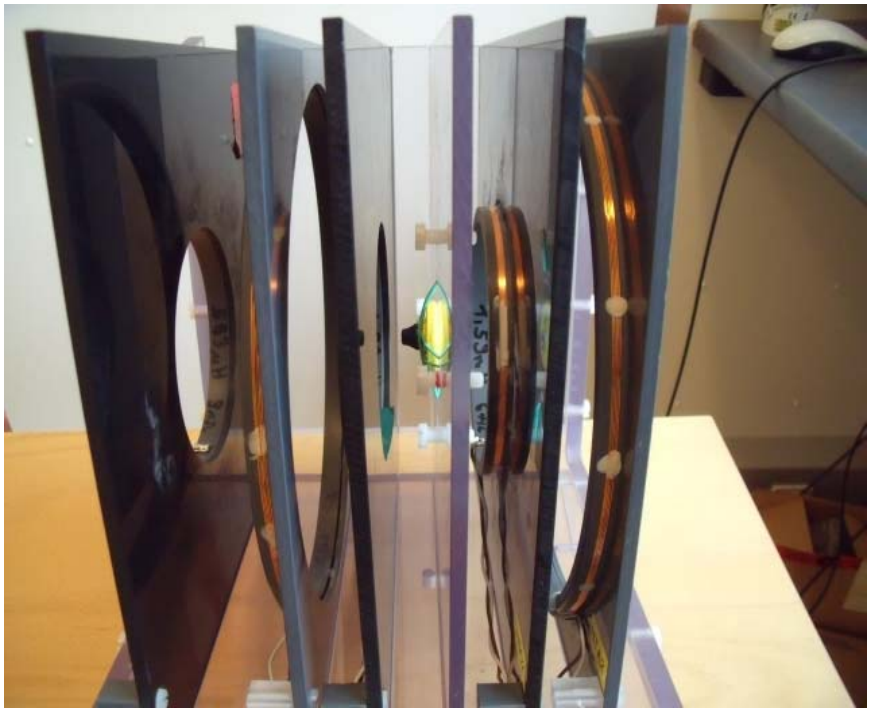
- artificial ageing (UV/rain)
- tensile test - breaking forces at different temperatures
- free fall test - shock impacts at different temperatures
- readability test acc. to ISO 24631-1 and 24631-3 after ageing and every test

EID environmental tests

Content (2)

Endurance tests:

- storage in extreme conditions
  - → 24 h at -25 °C
  - → 24 h at +55 °C
  - → 3 weeks at +40 °C/ 93 % RH)
- vibration test
  - → simulating a moving animal
- readability test acc. to ISO 24631-1 and 24631-3 after every environmental test
- animal welfare requirements

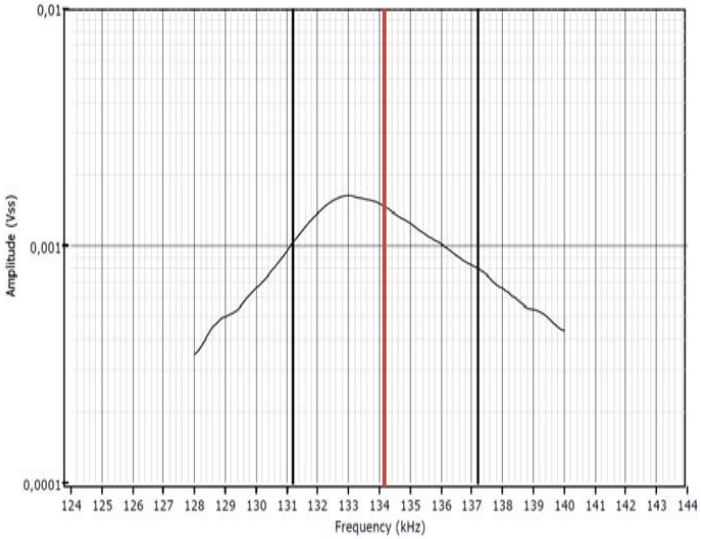


Helmholtz coil for ISO measurements of electronic ID devices

Readability: ISO conformance and performance test

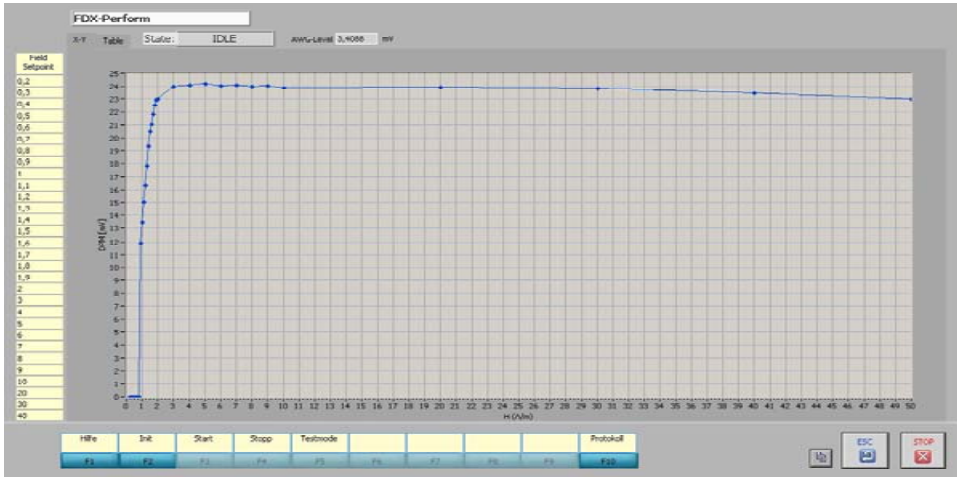
Conformance test (ISO 24631-1)

- verifying data structure acc. to ISO 11784/11785
- automatic comparison of calculated and measured values (CRC)
- resonance frequency check concerning compliance with tolerance limits (134.2 kHz ± 3 kHz)



Performance test (ISO 24631-3)

- min. activation field strength (related to reading distance)
  → 1.2 A/m (EU) vs. 0.6 A/m (ISO)
- stability of transponder signal in range of field strength



Thank you for listening!