



THE GLOBAL STANDARD
FOR LIVESTOCK DATA

Network. Guidelines. Certification.

GREENFEED & SNIFFER SOP REPORT

Benzoni Lorenzo (ANAFIBJ)

Raffaella Finocchiaro (ANAFIBJ)

Birgit Gredler-Grandl (WURL)

Members of ICAR Feed & Gas Working Group

ACKNOWLEDGEMENTS

Authors are, in alphabetical order:

Lorenzo Benzoni, ANAFIBJ, Italy

Donagh Berry, Teagasc, Ireland

A.E. van Breukelen, Wageningen Livestock Research, Netherlands

Elizabeth Dressler, Kansas State University, USA

Raffaella Finocchiaro, ANAFIBJ, Italy

Birgit Gredler-Grandl, Wageningen Livestock Research, Netherlands

Roger Hegarty, University of New England, Australia

Lisanne Koning, Wageningen Livestock Research, Netherlands

Ciarán Mc Donnell, Irish Cattle Breeding Federation, Ireland

Lorna McNaughton, Livestock Improvement Corporation (LIC), New Zealand

Gail Ritchie, University of Guelph, Canada

Aser García-Rodríguez, Instituto Nacional de Investigación y Tecnología Agraria, Spain

Oscar Gonzalez-Recio, Instituto Nacional de Investigación y Tecnología Agraria, Spain

Caeli Richardson, 2023 ICAR Brian Wickham Young Person Exchange Program (BWYPEX)

Trine Villumsen, Aarhus University, Denmark

INTRODUCTION

- Dairy cattle is known to be impactful on greenhouse gases (GHG) emissions for **over 10%** of livestock sector emission globally (*Gerber et al., 2013*);
- Methane (CH₄) and carbon dioxide (CO₂) emissions have been shown to be **heritable**, providing the basis for applying genetic selection for their reduction (*Cassandro et al., 2010*);
- **National breeding programs** and the genetic improvement can provide relevant contribution to reduce GHG emissions;
- Many Universities, Research Centers and Associations have started **collecting phenotypes** all over the world years ago.

INTRODUCTION

WEBINARS

- 5th December 2022: **GreenFeed** Standard Operating Procedure **Dairy Cattle**
- 7th December 2022: **GreenFeed** Standard Operating Procedure **Beef Cattle**
- 23rd February 2023: **Sniffer** Standard Operating Procedure

OBJECTIVE

- Share **knowledge** on GreenFeed and Sniffer operating procedure;
- Share **tips, tricks and trouble-shooting data** recording using Greenfeed and Sniffer systems;
- Revision of the **ICAR Guidelines** (*Section 20 - Recording Dairy Cattle Methane Emission for Genetic Evaluation*).

SUMMARY

GREENFEED

1. EQUIPMENT DESCRIPTION;
2. EXPERIMENTAL PROTOCOLS;
3. TRAINING AND ADAPTATION PERIOD;
4. PROBLEMS FACED AND UPGRADES.

SNIFFER

1. EQUIPMENT DESCRIPTION;
2. EXPERIMENTAL PROTOCOLS;
3. TRAINING AND ADAPTATION PERIOD;
4. PROBLEMS FACED AND UPGRADES.



THE GLOBAL STANDARD
FOR LIVESTOCK DATA

Network. Guidelines. Certification.

GREENFEED



EQUIPMENT DESCRIPTION

LOCATION

INDOOR

- **Solid**, non-slatted floor;
- Homogeneous **ventilation**;
- Irregular **ventilation** may negatively affect estimation;
- **Trailer**.

OUTDOOR

- **Solid** place (not in the mud);
 - Nearby **grazing site**;
 - Phone/Internet **connection**;
- Good **sunlight** (if equipped with solar panels);
 - Plastic and waterproof **cover**;
 - **Trailer** (only for short moving);
 - **Weather station** on top.

EQUIPMENT DESCRIPTION

SIDE SHIELDING

- Good side shielding must be **0.80-0.90 m wide and adjustable**, at least **2.5 m long**, both indoor and outdoor;
- WURL (NL) have created a “**L-port gate**” that closes behind the animal, so it cannot be pushed out of the unit by other cows. Cows that use this “L-port gate” are calmer.



EQUIPMENT DESCRIPTION

NOISE AND FEED

- All users consider positive the **ventilation noise** of the GreenFeed fan. This ventilation noise is easily associated by the animals with the supply of feed, so the animals **adapt more quickly**.
- Recommended use a **pellet feed** with a diameter of **less than 7 mm** as suggested by C-Lock. Few users use **feed blocks**.



EXPERIMENTAL PROTOCOLS

- **10 – 40 animals** per GreenFeed unit;
- The overall duration of the trial varies, from a **minimum of 7 days up to a year**, both indoor and outdoor, according to the purpose of the experimental trial;
- The **wide variability** of the experimental protocol variables can be summarized as follows:

	INDOOR	OUTDOOR
DROP DISPENSE INTERVAL	10 - 60 seconds	10 - 30 seconds
MIN. TIME BETWEEN FEEDING PERIODS	7.200 - 21.600 seconds (2 - 6 hours)	3.600 - 14.400 seconds (1 - 4 hours)
MAX. DROPS PER FEEDING TIME	4 - 25	4 - 25
MAX. FEEDING PERIODS	4 - 12	4 - 12

TRAINING AND ADAPTATION PERIOD

- The overall **duration** of the training and adaptation period lasts from **7 to 20 days**, both indoor and outdoor;
- Slightly **adjust the “drop dispense interval”**, for example, reducing to 10 seconds in first days of adaptation, then increasing to 20 seconds and then use the experimental protocol;
- Set the **funnel** at the largest size and **reduce it regularly** day by day up to the end of the training period and the start of the experimental trial;
- When based on grazing, it is important that the machine is moved to **fresh pasture**;
- **Spread concentrates** in the chute or use salt licks.

PROBLEMS FACED AND UPGRADES

PROBLEM	SOLUTION	SUGGESTIONS/UPGRADES
Feed clogging in the bin	Unclog the feed bin and try a more solid pellet. Prevent the feed bin from moist.	Extra molasses in feed pellet.
Motor problem	Replaced using C-Lock spare parts and assistance.	
Airflow problems	Replaced using C-Lock spare parts and assistance.	
Connectivity problem	Replaced using C-Lock spare parts and assistance.	In alternative, purchase an external Wi-Fi router or SIM-card router.
Power supply problem	Replaced using C-Lock spare parts and assistance.	
Leaky CO ₂ cylinder and lower CO ₂ release	Replaced CO ₂ cylinder by C-Lock.	Make sure to never hold the CO ₂ tool upside down when attached to a CO ₂ cylinder.

PROBLEMS FACED AND UPGRADES

PROBLEM	SOLUTION	SUGGESTIONS/UPGRADES
Concentration sensor	Replaced using C-Lock spare parts and assistance.	
Shipping time and shipping issues in some parts of the world (e.g., Europe and Oceania)		List of “must have spare parts” to create a personal warehouse. European or Oceanian dealer?
Feed bin brush chewed by a rodent	Tack on feed bin chute.	Internal component more sealed.

- C-Lock **assistance** is generally very **good** (video tutorials, operating instructions...).



THE GLOBAL STANDARD
FOR LIVESTOCK DATA

Network. Guidelines. Certification.

SNIFFER



EQUIPMENT DESCRIPTION

- Several suppliers of this product are available, but all systems share the **same basic structure**;
- Generally installed on **AMS or AFS**;
- Essential a filter at level of the suction tube to avoid **clogging the cylinder by saliva, feed or dust**;
- At least two gas meters: **CH₄ and CO₂**. Further gas meters are considered a plus;
- Gas Card **sensitivity**: 0-10.000 ppm for CH₄;
0-50.000 ppm for CO₂;
- 5G/ Wi-Fi **connection**;
- Hard disk is necessary to ensure **data storing**;
- If not waterproof, provide a **waterproof cover**.

EXPERIMENTAL PROTOCOLS

- No particular experimental protocols are applied. Once installed, the system **runs continuously**;
- Change in **diet** are not required;
- Routinely **calibration**. Advanced sniffers are provided with self zero and span (semi) automatic calibration.

TRAINING AND ADAPTATION PERIOD

- Training, handling or adaptation period are **not required**.



PROBLEMS FACED AND UPGRADES

PROBLEM	SOLUTION	SUGGESTIONS/UPGRADES
Clogging problems	Clean tubes with pressured air manually.	
Animals identification	Antenna for ID reader is not always successful. Use AMS data identification and merge them later.	
Calibration procedure not standardized.		
Personnel in charge of the trial	Good technician who monitors sniffers' activities on daily basis and knows AMS and/or AFS working.	

CONCLUSIONS

- GreenFeed and Sniffer are two different systems, but to date they are the most reliable;
- Definition of SOP and Guidelines are only first steps;
- Further steps:
 - Data editing;
 - Trait definition;
 - Phenotypic and genetic analysis.

THANKS!



Lorenzo Benzoni
Raffaella Finocchiaro
Birgit Gredler-Grandl (WURL)



lorenzobenzoni@anafi.it
raffaellafinocchiaro@anafi.it
birgit.gredler-grandl@wur.nl



www.icar.org
www.anafibj.it

