



# Simple monitor for daily behaviours with a wireless temperature data logger on a collar of unrestricted cows

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## Objective

1. Intensive dairy farming requires herd monitoring system to ensure high producing healthy herd.
2. A simple and useful monitor system of daily behaviour of dairy cows without direct sensor on the body should be developed.
3. Two prototypes of the monitor using a temperature data logger and a shock recorder on a collar were manufactured for a trial.
4. The practical precision of these prototypes was tested.



A 2 channel wireless Temperature data logger "Ondo-tori", T and D, Japan

Shock recorder, G-MEN 3GT, Sric, Japan



Put a collar with a temperature data logger or a shock recorder around the neck of a cow



## Eating

The fore edge of the collar touches on the jaw

Temperature : Fore edge > Rear edge

Highest shock is recorded when the collar stopped at the jaw

## Ruminating

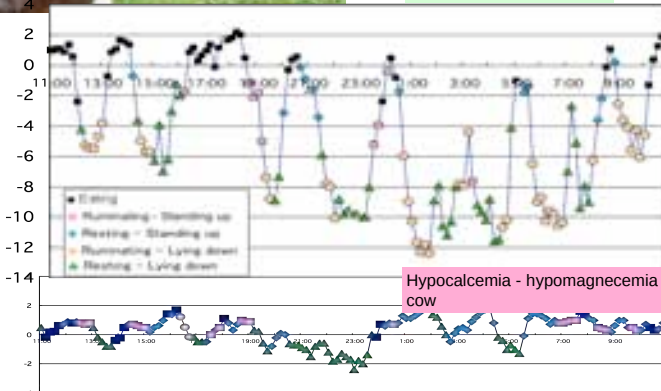
The rear edge of the collar touches on the breast

Temperature : Fore edge < Rear edge

Highest shock is recorded when rumination bolus is regurgitated



Healthy high yielding cow



Hypocalcemia - hypomagnecemia COW

Table 1. Accuracy of the behaviour monitor in normal cows and cows in heat or just before calving

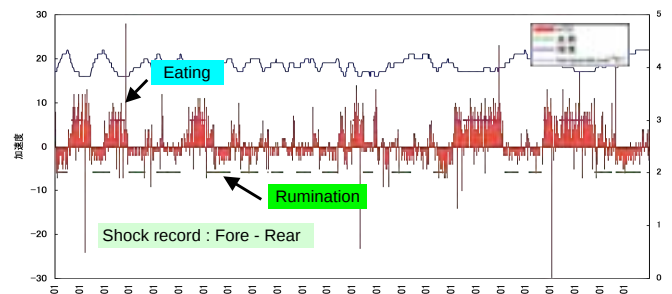
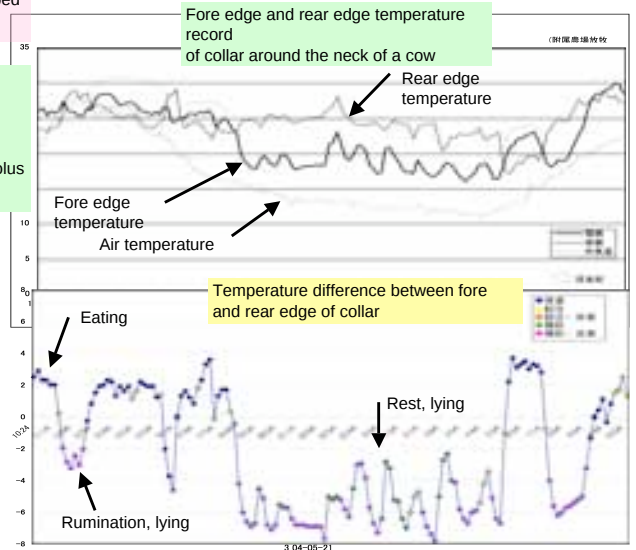
| Cow No.      |            | Eating time |           |       | Ruminating time |           |       |
|--------------|------------|-------------|-----------|-------|-----------------|-----------|-------|
|              |            | Actual      | Estimated | E/A   | Actual          | Estimated | E/A   |
| 305          | Normal cow | 337         | 371       | 1.101 | 661             | 669       | 1.012 |
| 405          |            | 334         | 326       | 0.976 | 482             | 450       | 0.934 |
| 374-1        |            | 480         | 474       | 0.988 | 430             | 501       | 1.165 |
| 374-2        |            | 400         | 415       | 1.038 | 433             | 424       | 0.979 |
| 351-1        |            | 486         | 399       | 0.821 | 571             | 607       | 1.063 |
| 351-2        |            | 462         | 473       | 1.024 | 560             | 560       | 1.000 |
| Mean         |            | 416.5       | 409.7     | 0.991 | 522.8           | 535.2     | 1.026 |
| SD           |            | 69.8        | 57.9      | 0.09  | 90.7            | 94.3      | 0.08  |
| 443-1        | Heat       | 384         | 332       | 0.865 | 312             | 322       | 1.032 |
| 443-2        | H-2        | 332         | 290       | 0.873 | 552             | 678       | 1.228 |
| 443-3        |            | 430         | 488       | 1.135 | 472             | 466       | 0.987 |
| 449-1        | Heat       | 306         | 294       | 0.961 | 536             | 556       | 1.037 |
| 449-2        | H-2        | 448         | 314       | 0.701 | 562             | 630       | 1.121 |
| 388-1        |            | 280         | 340       | 1.214 | 474             | 552       | 1.165 |
| 388-2        | C-2        | 280         | 542       | 1.936 | 490             | 408       | 0.833 |
| 388-3        | C-1        | 332         | 224       | 0.675 | 448             | 602       | 1.344 |
| 388-4        | Calving    | 498         | 258       | 0.518 | 334             | 490       | 1.467 |
| Heat-Calving |            | 365.6       | 342.4     | 0.936 | 464.4           | 522.7     | 1.135 |
| H-C-SD       |            | 78.5        | 105       | 0.419 | 89.2            | 112.7     | 0.193 |

Both monitors with temperature or shock recorder are very accurate for normal cows. However, the accuracy was reduced for cows in heat or just before calving.

Table 2 shows starting hour of heat and its duration.

Table 2. Number of shock bigger than 1.5 G every 3 hours in a cow in heat

| Hours of day | 18~21 | 21~24 | 24~3 | 3~6 | 6~9 | 9~12 | 12~15 | 15~18 | 合計 |
|--------------|-------|-------|------|-----|-----|------|-------|-------|----|
| Day-1        | 3     | 2     | 3    | 6   | 1   | 15   | 16    | 12    | 58 |
| Day-2        | 1     | 0     | 2    | 0   | 1   | 3    | 1     | 3     | 11 |
| Day-3        | 3     | 0     | 3    | 1   | 1   | 2    | 2     | 5     | 17 |



## Conclusion

- A wireless temperature recorder or a shock recorder put on the collar around the neck of cows was useful to monitor eating and ruminating behaviour in normal cows.
- Temperature monitor may be not useful in the very hot season.
- The combination monitor with temperature and shock recorder is better.
- The system may be useful to monitor nutritional condition or to check herd health by comparing with normal behaviour record of cows.
- The authors are applying for a patent : 特許出願中:特願2007-68041