Bayer has been a long-time user of implantable telemetry in dogs for Safety Pharmacology studies. They found that the new technology offered improved animal welfare, simplified the technical system requirements, and provided enhanced physiologic data to improve their study outcomes.

The Challenge. Animal welfare guidelines specify that animals shall be housed socially with compatible groups in cages that meet minimum size requirements. Bayer designed their dog facility to comply with these guidelines, however, due to the technical limitations of PhysioTel™ legacy telemetry, Bayer instead had to individually house dogs in smaller enclosures (cabins) for the period of data recording. These limitations included the potential for cross-talk between implants due to all implants operating on the same frequency as well as a limited transmission range.

To work within the legacy technology limitations, Bayer took the following steps to successfully acquire data during telemetry studies:

- Modified their cages to create a smaller enclosure (cabin) within the larger cage for use during monitoring periods (see Figure 1 for the cage set-up)
- Trained their dogs to tolerate the temporary separation from their kennel companion
- Increased the amount of animal handling during studies in order to move the animals to the smaller enclosures during data collection periods

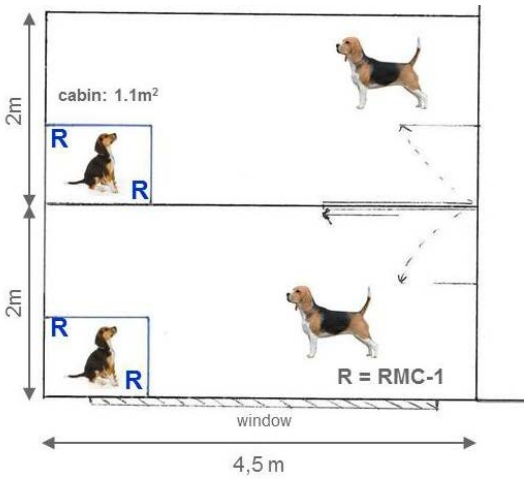

Figure 1: Set-up for PhysioTel legacy telemetry system.

Study results observed from this set-up included:

- Increased stress in animals, which was observed through physiologic data and video monitoring
    - Animals were accustomed to being housed in an area 9 m^2, but during data collection the area was reduced to 1.1 m^2
- Instances of 'noisy' signals due to electromagnetic interference as shown in Figure 2

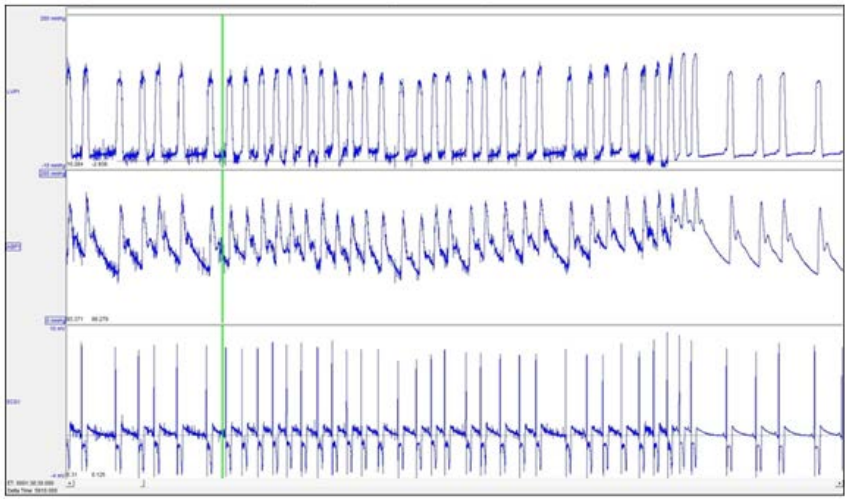

Figure 2: Example of 'noisy' signals using PhysioTel legacy telemetry.

The Solution. To overcome limitations associated with the PhysioTel legacy telemetry system, Bayer invested in DSI's large animal PhysioTel™ Digital (PTD) system. Bayer was able to adapt the PTD technology within their existing animal housing.

- PTD allowed Bayer to monitor animals, along with their kennel companions, in their standard cages, eliminating the need to transfer the animals to the smaller cabin enclosure. This resulted in animals that were less stressed, as evidenced by telemetry and video data.
- Animals had access to the entire 18 m^2 enclosure as shown in Figure 3.
- The longer transmission range of PTD meant that 4 TRX-1 transceivers were sufficient to monitor the 4 animals for the entire 18 m^2 enclosure compared to needing 2 RMC-1 receivers for each 1 m^2 cabin in the PhysioTel legacy system set-up to monitor 1 animal.
- As shown in Figure 4, data quality was optimized as a result of PTD's digital signal; any noise associated with physiologic signals was a result of animal movement.

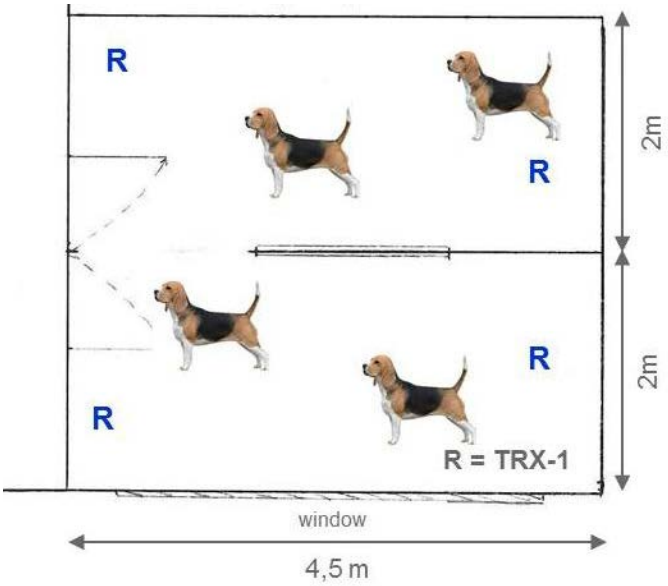

Figure 3: Cage set-up after implementing PhysioTel Digital.

Figure 4: Example of telemetry data from PhysioTel Digital

The Outcome. Bayer compared the results from PhysioTel Digital to their PhysioTel legacy system experience and found the following advantages with PhysioTel Digital:

- Enhance Animal Welfare with Social Housing
  - Bayer was able to house and monitor 4 animals within the same cage
  - Animal monitoring in home cages led to reduced animal stress and a decrease in blood pressure and heart rate baseline measurements

- Better Data with Improved Signal Quality
  - The digital data provides clean signals allowing for more precise measurement of derived parameters, such as ECG interval duration
  - Refined animal model with more physiologically normal baseline values
  - Reduced data variability for mean blood pressure, left ventricular dP/dt_{max} and heart rate (see table below)

Physiologic Signal (n=4 dogs) (Mean ± SD)	Legacy D70-PCTP Single Housed	PTD Social Housed
Mean Blood Pressure	116 ± 10 mmHg	98 ± 7 mmHg
LV dP/dt_{max}	3912 ± 921 mmHg/s	2703 ± 319 mmHg/s
Mean Heart Rate	96 ± 23 bpm	93 ± 17 bpm

  - Overall this allowed for a more comprehensive interpretation of study results and outcomes

- Other Benefits of PhysioTel Digital
  - Auto calibration eliminates potential errors that could occur from manually entering calibration data
  - Bayer routinely uses their animals in several studies and the automatic and real-time battery life monitoring with PhysioTel Digital allows them to better plan animal use with respect to study duration
  - Use of Notebook computer allows for more flexibility and mobility within a large animal facility

DSI's PhysioTel Digital large animal physiologic monitoring platform will improve, simplify, and enhance scientific research.