Roland USERS GROUP INSIDER

Welcome to Roland's Insider, where you can read, watch, listen, and learn about Roland gear. Click the **Artists** tab for interviews with the world's finest musicians, producers, remixers, and more. Look for behind-the-scenes photos, videos, and audio clips sprinkled throughout. Click **Hands-On** for valuable tips, tricks, and techniques from Roland product specialists. **In The News** is where you'll info on the latest Roland-related events and happenings. **From The Editor** is your place to hear from (and respond to) the Roland editorial team. And, last but not least, the **Archive** tab is your source for "vintage" features and how-to articles. Enjoy!

Where's the Beef?

Researching the Grazing Habits of Steers with the R-09

By Jim Bybee — May 2007

The R-09, Edirol's compact audio recorder, was designed to go places, and go it has. With built-in mics, recording quality up to 24-bit/48 kHz, removable SD media, and AA-battery power, this pocket-sized powerhouse has found a home with thousands of folks, musicians and non-musicians alike. It's easy to imagine how most owners use their R-09s — in musical scenarios, they're used to record rehearsals, performances, and song ideas. In non-musical contexts, R-09s record lectures, workshops, interviews, or even the sounds of nature for sound effects. But we recently heard of an R-09 user that's recording some very specific natural sounds: the sounds of steers, and in particular, the sounds of steers *eating*. Yep. Steers eating. Why steers, you ask? As it turns out, it's all in the name of science…and a healthier dinner. (Any non-carnivores might want to look away now…)

The man responsible for this unique use of the R-09 is a research scientist named Bill Clapham. Bill works for the Agricultural Research Service (ARS), which is the research arm of the U.S. Department of Agriculture (USDA). He's currently based in Beaver, West Virginia, where he leads a project called *Pasture-Based Beef Systems for Appalachia*. This project is a collaborative effort among the USDA-ARS, West Virginia University, Virginia Tech, and Clemson University.

As the project's name suggests, they're studying ways to produce beef cattle on a natural, pasture-based diet. "Conventional beef production in this country is cattle that are sent out to feedlots in the Midwest or the plains states, where they're fattened on corn," Bill explains. "The system we're working on is raising these animals totally on forage, forage being grasses, clovers, and other legumes. There's a tremendous difference in the product; it tastes a little bit different, and the fat profile is profoundly different." And this contributes to healthy eating. "The difference in the fat profile is that the product has a lot more of the polyunsaturated fatty acids; the content of the Omega-3 is much higher," he tells us. "And that has been reported to be associated with lower incidence of cardiovascular disease and certain cancers. The bottom line is that it's a very healthy fat profile; you're getting the good fat."

Helpful Links

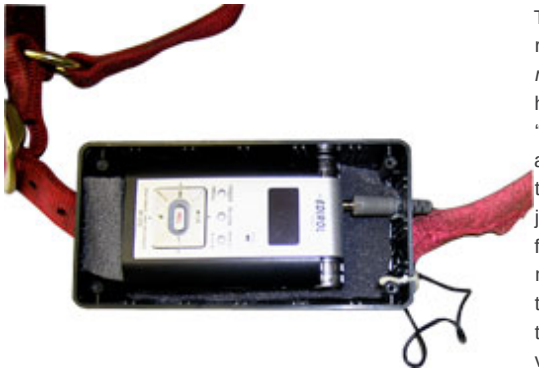
- Visit BossUS.com
- Current Promotions
- Downloads & Updates
- Service Center Locator
- Warranty Information
- Glossary of Terms

Products
What's New
Support
Community
Events & Clinics
Store
Corporate

Additionally, pasture feeding is much easier on the cattle, as they get to spend their days roaming and foraging. Bill points out another important thing about pasture-fed beef: “You don’t supplement the animals with hormones or antibiotics. That’s a big difference, because people who buy pasture-raised beef don’t want those chemicals.”

Okay, so how does the R-09 fit into this picture? According to Bill, it starts with the performance efficiency of the cattle. “When we’re looking at performance of animals — and by performance I mean weight gain per day — we’re very interested in terms that can give us some answers about efficiency. And the issue of efficiency is this: Let’s say you have two steers, and you give them each ten pounds of feed. If one gains two pounds, and the other gains three pounds, the one that gains three pounds is more efficient.” This is important, as heavier cattle means higher profits for farmers.

“To estimate [efficiency], you need to know actual intake,” says Bill. “In a feedlot, that’s easy to do, because they’re eating out of a bunker, and you can easily measure how much they’ve eaten. [But when you] put animals out in a pasture, it becomes an intractable problem. People have been trying to estimate this for eons, and no one’s succeeded.”



To solve this dilemma, Bill investigated the idea of recording the steers *as* they eat, to determine *how much* they eat. He discovered that a few researchers had tried this in the past with unsuccessful results. “They mounted microphones on the foreheads of the animals, and measured the sound waves of bites through the skull. We thought we could do a better job.” Unfortunately, Bill’s first efforts were equally futile. He explains, “I built a little halter with a lavalier microphone down by the steer’s jaw, and then ran this up into a little box that had a wireless transmitter. Then, we hooked the receiver onto a video camera, and sat out there in the field videotaping the steers.” With this setup, Bill was limited to just one hour of recording time. However, that was the least of his worries. “These are herd animals, and any time a steer walked in front of another one, we’d get a lot of noise and signal loss. We got some data, but it wasn’t really good.”

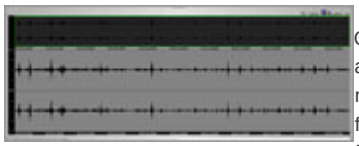
Realizing that wireless transmission wasn’t going to cut it, Bill sought out a self-contained audio recorder capable of long recording times. He also needed the device to be small, so that that he could place it in a weatherproof box that he mounts onto a steer’s neck. As it happens, he stumbled onto the R-09 because of his background as a keyboard player. “I’m a musician on the side, and [Edirol dealer] Sweetwater Sound turned me on to the R-09,” he tells us. “I looked at it, and I looked at [competitor’s recorders]. We chose the R-09 for a couple specific reasons. The first is that the memory is on [an SD] card, and the second is that the power supply is two AA batteries.” These features allow Bill to swap out recording memory and power in the field. The ability to connect an external microphone to the R-09 was another essential feature. “We saw all sorts of advantages with the R-09. We put them out, and they gave us great recordings, and really, really good data.”

What Bill records with the R-09 is the animal’s actual process of feeding. “When a steer grazes, they’ll stick out their tongue and wrap it around a bunch of grass or forage, and then the tongue will rip it [from the ground],” he explains. To capture this sound up-close, he connects a lavalier microphone to the R-09’s MIC jack. “The microphone’s right down by the jaw, and what it’s picking up is the ripping — the shearing — of that forage. When these [animals] are grazing, they take a bite a second. They are [eating] machines when they get out there. If you try to count [bites] by watching them, it’s impossible, so sound [research] really works well.”

To analyze the grazing data he captures on the R-09, Bill offloads it to a PC and uses a software program called SIGNAL by Engineering Design (www.engdes.com). “Kim Beeman wrote the software. He’s a very smart guy, an expert in acoustics from MIT,” he explains. “He modified plug-ins for SIGNAL so it would do what we wanted it to do. His software is used by, I think, NASA, and all sorts of people. He’s tracked whale, he’s done all sorts of things. This program looks at the waveform, and makes numerous automatic calculations.”

The software differentiates the audio frequencies of the steer’s shearing of the grass versus those of the actual chewing. As Bill explains, “The shearing occurs at 16-20 kHz, [and] the chewing occurs around 400

Hz. They're easily separable events." Through mathematic calculations, the software measures the energy in each event, which gives Bill the data he needs to estimate a steer's efficiency. "We can relate the energy of that event to the amount of forage they've eaten."



Listen To The Results

Currently, Bill's using four R-09s for his steer research, but he's looking at increasing that number three-fold in the near future. And his research success with the R-09 has led him to purchase one for himself, for use in his own personal music-making projects. "I get a lot of ideas for writing, and the R-09 has allowed me to capture them. It's probably the most important creative tool I have, because it's there when I need it and it's easy to use. I've got a bunch of other [recording] stuff, but the R-09 is just so much more useful because it doesn't take long to set up and go. It's a great tool."

Ultimately, the purpose of Bill's research is to increase the viability of raising pasture-fed beef, as its demand is increasing in our health-conscience populace. As Bill explains, "Right now, the market for pasture-raised beef is growing in double digits. The demand is there. [And] if you look at the cost of corn — that is, feed [for feedlots] — it's going up because of ethanol production. It's a double-whammy why pasture-raised beef is getting a lot of attention now." So, the next time you dine on a pasture-raised steak, there's a good chance that Bill Clapham — and an R-09 — played a part in getting it to your plate. Bon appétit!

To learn more about the research Bill and his team are conducting, click here. On the side, Bill performs in West Virginia with his band Sweety. You can check them out at their website: www.sweety.cc.

For more information on the R-09, click here.