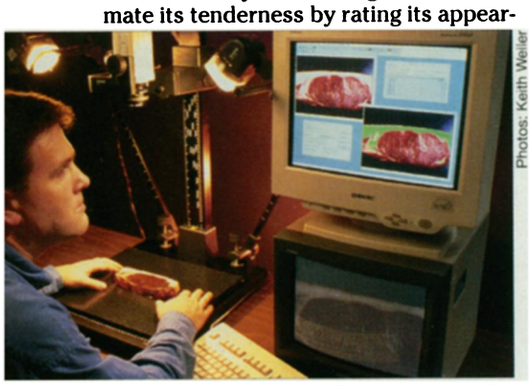
Grade Meat Tender, Grade Meat True ...

Having trouble selecting meat that will practically melt in your mouth? You're not alone. Restaurants and butchers, too, encounter the same frustration. Even cuts labeled prime, the top grade, sometimes offer diners a tough chew.

The problem, explains Mohammad Koohmaraie, is that the current carcass-grading procedures—designed to distinguish the tough from the tender—rely heavily on marbling, the presence of intramuscular fat. Yet only about 10 percent of the variation in a steak's tenderness correlates with marbling, according to research by his team at the Agriculture Department's Meat Animal Research Center (MARC) in Clay Center, Neb.

The MARC scientists have now cobbled together an alternative tenderness-rating system. In tests, it has offered an unprecedented 94 percent accuracy.

Today, meat graders slice open a carcass 1 to 3 days after slaughter and estimate its tenderness by rating its appearance—muscle maturity and color as well as marbling. The system that Koohmaraie's group has developed requires slicing off a 1-inch rib-eye steak, cooking it for 4 minutes, then cutting it with a miniature guillotine that measures shear force.



Photos: Keith Weller

MARC scientist runs a rib eye through the image-analysis program.

To make the system even more attractive to meat packers, the scientists have just added an image-analysis program. From a glance at the uncooked rib eye, a computer calculates the pounds of retail cuts that the rest of the carcass will yield when butchered.

Although not automated, the system "is ready for prime time," Koohmaraie says. It adds $4.50 per carcass, or 15 cents per pound retail, he calculates.

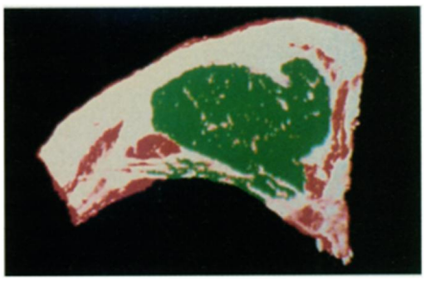
Meat producers should be able to easily recover these costs, according to in-store studies led by Ted C. Schroeder at Kansas State University in Manhattan. His team grilled two rib-eye steaks from different carcasses and offered shoppers a taste test. Their reward: a free steak from the tougher carcass.

The vast majority not only preferred the tender steak but offered hard cash to swap the tough freebie for the more tender meat. Most anted up at least $1.23—and some paid over $3—per pound.

This suggests that by marketing the tender cuts under a new, brand-name label that guarantees tenderness, savvy packers could quickly "corner the market" for high-value meats, says Gary C. Smith of Colorado State University in Fort Collins. Though large-scale packers might initially balk at adopting this new grading system, he says they'll soon realize that without it they risk losing the most lucrative part of the market.

Indeed, they're already losing big time, argues Wayne D. Purcell of Virginia Polytechnic Institute and State University in Blacksburg. Every year for the past 20, U.S. consumers have purchased less beef than they did the year before. They've been turned off in part, he maintains, by the industry's "25 percent product-failure rate"—unexpectedly tough meat.

"Would you buy John Deere tractors if 25 percent of the new ones wouldn't start?" he chides producers.



Green in image shows the largest area of lean tissue, a step in estimating the retail yield of a carcass.

Now that the MARC group has unveiled a solution, Purcell says, "I think the general consensus in the industry is that we need to move forward on it."

In the long term, he and Smith argue, the ability to identify—and charge a premium for—guaranteed-tender carcasses should give producers an economic incentive for breeding animals with more tender muscle. *—J. Raloff*

Algae need not be the fittest to survive

Two biologists working at a computer have upended some commonsense ideas of ecology. Competition for scarce resources does not necessarily winnow out redundant species, they find, and diversity need not hinge on specialization.

"It's a pretty spectacularly interesting result," comments ecologist Stephen P. Hubbell of the University of Georgia in Athens.

The researchers undertook their study to investigate the so-called paradox of the plankton. Twenty to 40 different species of phytoplankton—such as diatoms and algae—can coexist within a single cubic centimeter of water, all vying just for light and a handful of nutrients.

This observation has suggested that ecologists' justification of a species' existence in terms of an available niche could be misguided. It has even cast doubt on the principle that only the fittest survive.

Theoretical ecologist Jef Huisman of the University of Amsterdam and mathematical biologist Franz J. Weissing of the University of Groningen, both in the Netherlands, reached a new perspective on this conundrum by modeling plankton competition on a computer. They describe their work in the Nov. 25 NATURE.

Their simulations used simple equations interrelating the population size of different species and the abundance of various resources in a homogeneous environment. The species in the model differed in the effectiveness with which they scavenged various resources, so that they could excel at the exploitation of some nutrients while competing poorly for others.

Previously, modelers had simulated the competition of species for two limit-

M.R. Martin, Adirondack Aq. Inst.

Diatoms and algae from Upper Saranac Lake, N.Y. Each view is about 1 millimeter across. (Left) Cyclotella bodanica, Asterionella formosa, *and a species of the genus* Synura. *(Right)* Fragilaria crotonensis, Anabaena flos-aquae, *and a species each of the genera* Mallamonas *and probably* Cosmarium.