

BALCHEM™


ANIMAL NUTRITION & HEALTH

ReaShure®

Rumen Protected Choline

Helping her meet her Energy Needs is the Foundation for Health, Performance & Fertility.


Never jeopardize their energy status



Ten tons of milk... plus a hefty calf... take critical lots of energy. Protect their livers. Protect their energy status.

- The liver is the center of energy balance in the cow
- Energy status drives fertility, milk yield and health
- Bio-available choline is critical for a healthy liver
- Reashure® Choline is the only proven tool shown to consistently protect liver function and maintain a healthy energy status in dairy herds

Reashure® CHOLINE
from BALCHEM™



BALCHEM
ANIMAL NUTRITION & HEALTH
World's Best Quality • Worldwide Service

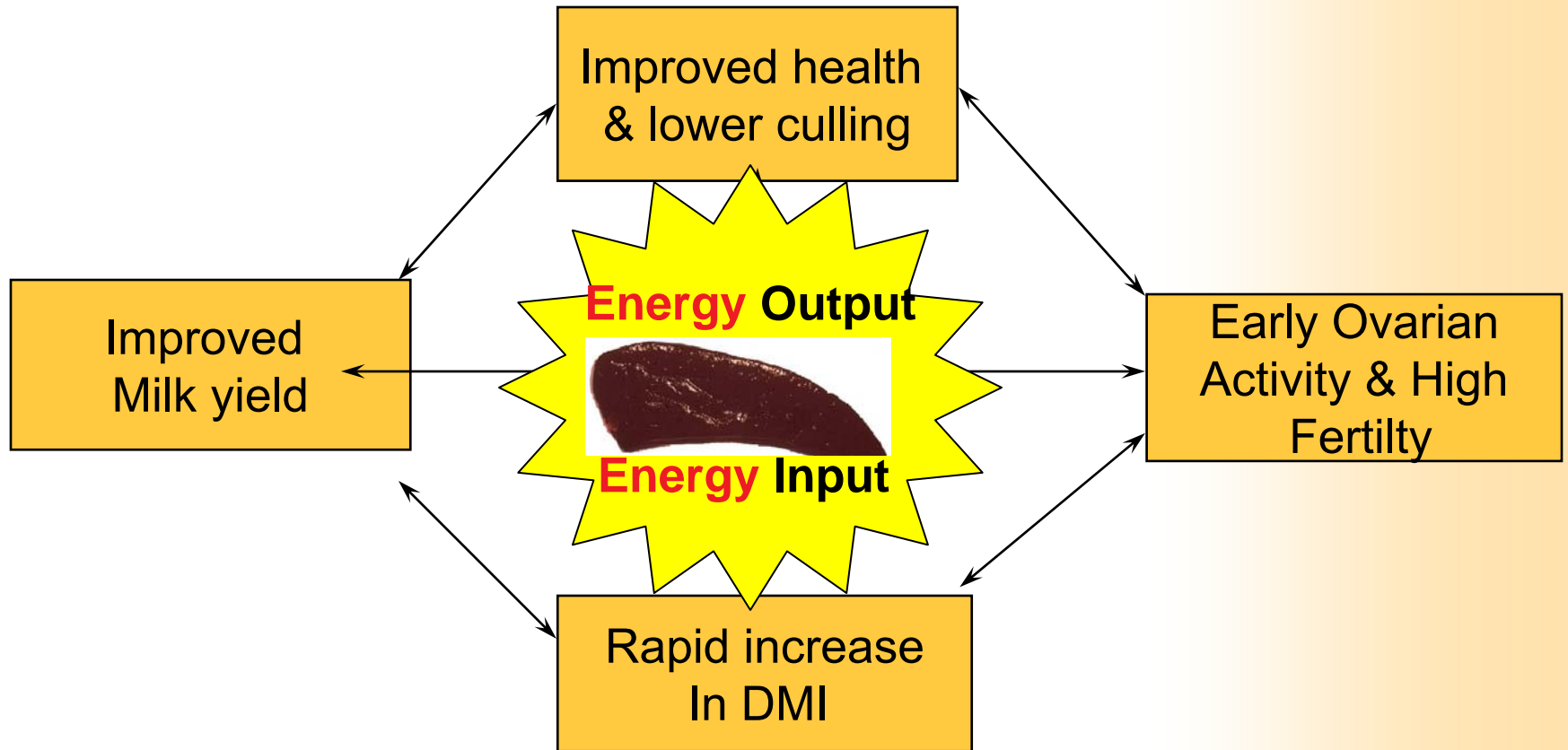
The global leader in **protection** nutrition™

Contact us now for your local Reashure distributor.
anh@balchem.com • www.reashure.com • USA 1-800-780-9233

A Healthy Liver is Critical for a Successful Transition Period



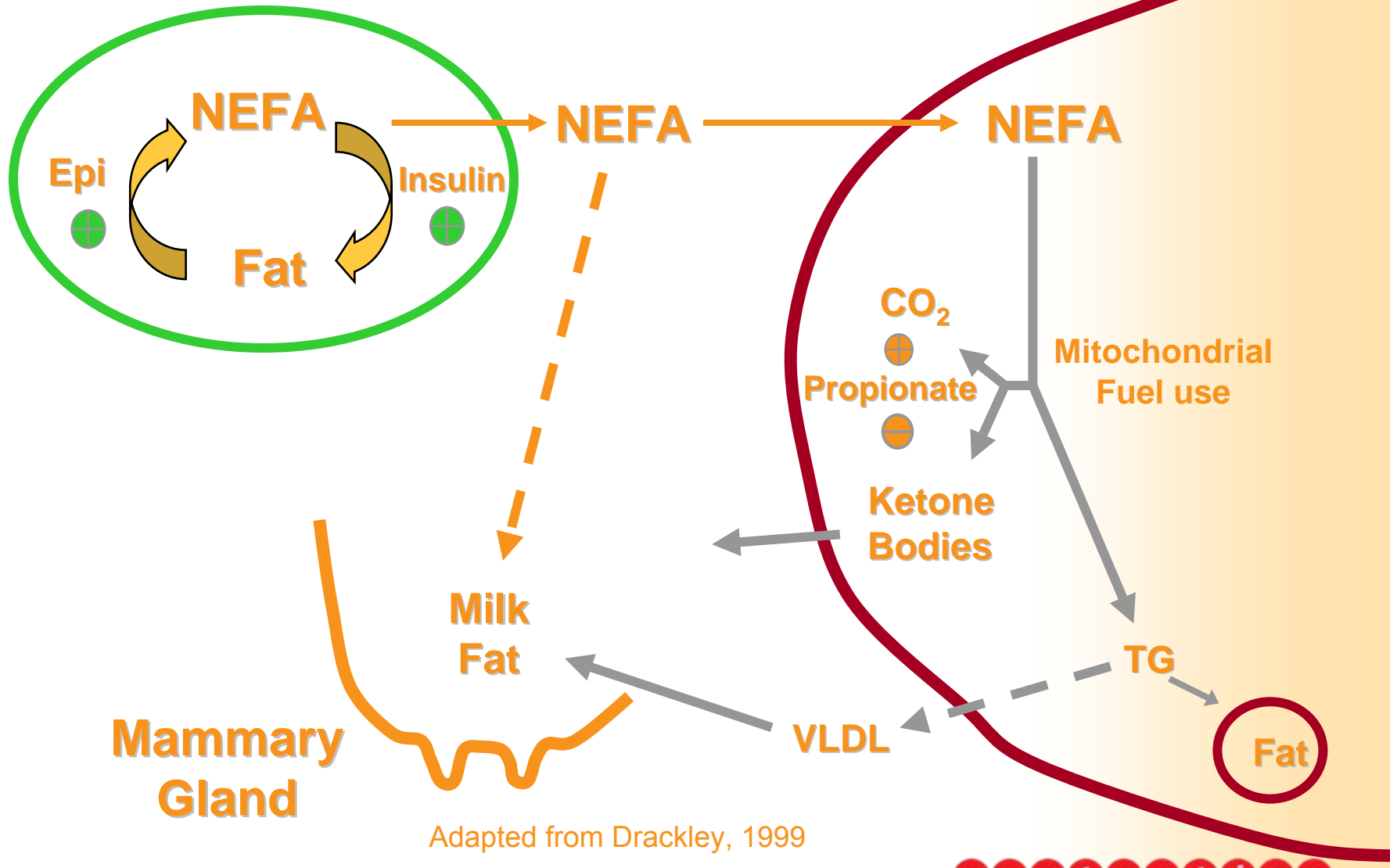
The cow's **Liver** orchestrates the balance between **energy** input and output to optimize transition cow health, production and reproduction.





Body fat

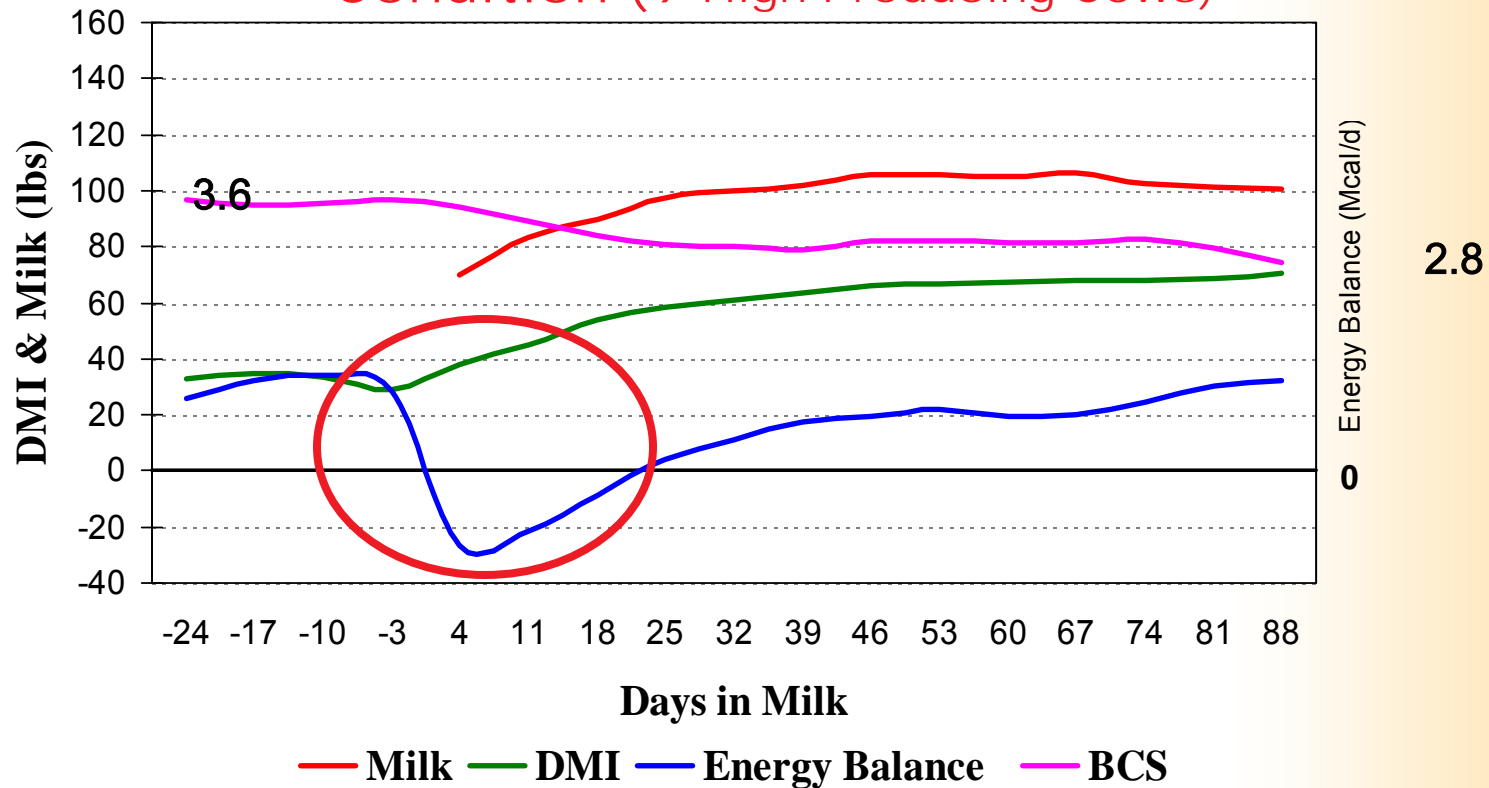
Liver



Adapted from Drackley, 1999

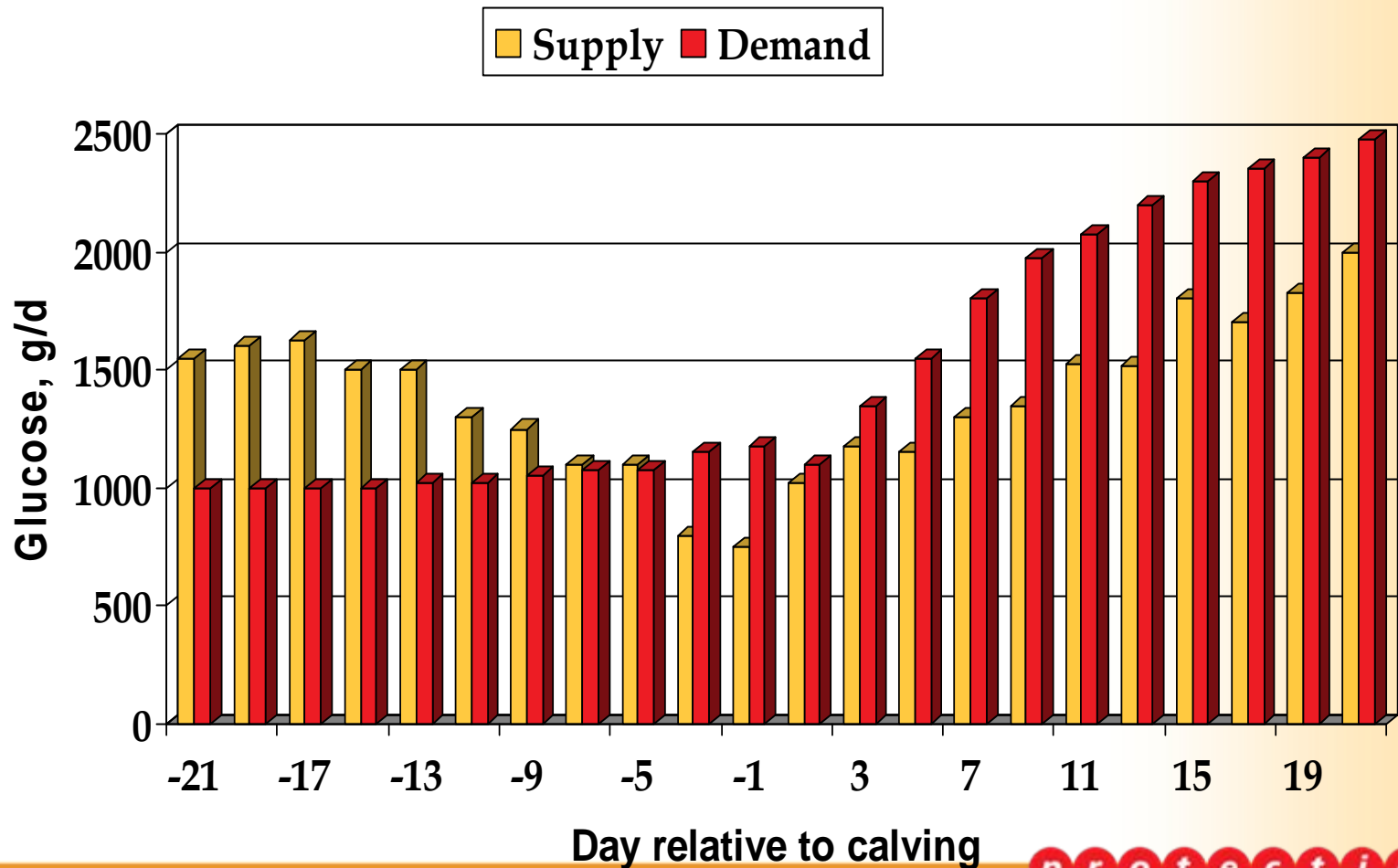
All Cows are energy deficient at calving and must mobilize fat to make up for a glucose deficiency

Milk, Dry Matter Intake, Energy Balance and Body Condition (9 High Producing Cows)



Source: 2002, Dr. Mark McGuire, Univ. of Idaho

Glucose demand vs. supply. A glucose deficit post calving



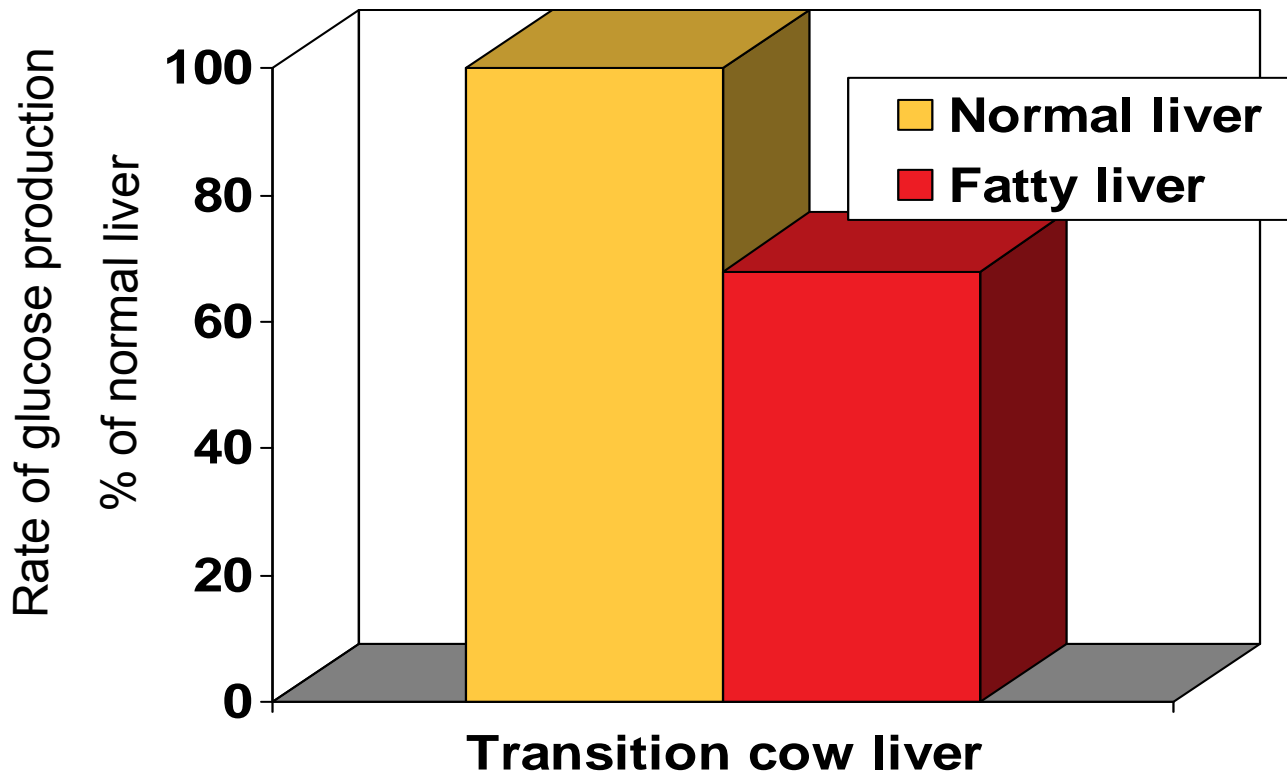




The Liver is the major source of Glucose production and storage in the cow

- Major liver substrate to generate glucose is the volatile fatty acids (VFA) namely propionate.
- Little starch (glucose) escapes rumen fermentation
 - Consequently little dietary starch is absorbed at small intestine and what does get absorbed is used at the gut tissue level and does not reach the blood
- Cow relies exclusively on gluconeogenesis to generate needed glucose
- The liver is the predominate site for glycogen the storage form of glucose.

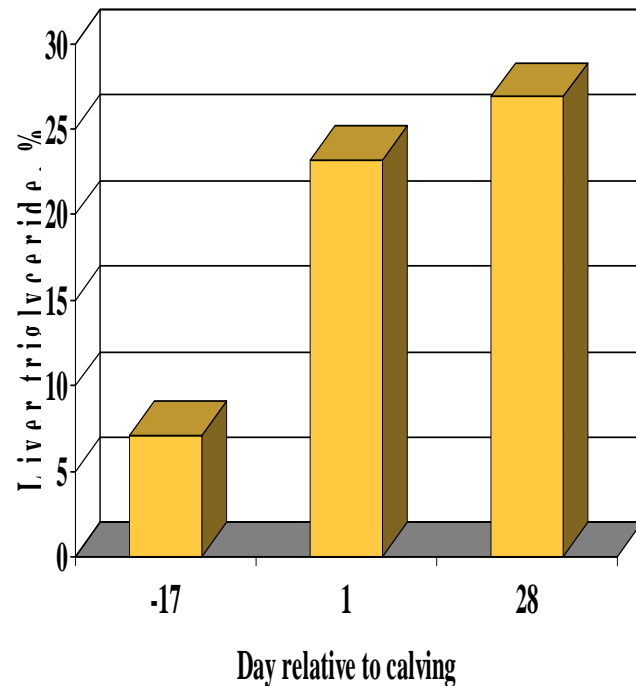
Cows with more fat in their livers make less glucose



Adapted from Overton and Piepenbrink, 1999

Cadorniga-Valino, C et al., 1997. J. Dairy Sci. 80:646-656.

All Cows mobilize fat at calving and as a result many develop fatty livers.



- Up to 60% of transition cows have fatty liver build-up
- This build-up leads to increased metabolic problems and lost milk production
- Subclinical ketosis

Bertics et al., 1992
UW Madison

- “In the first month after calving, 5 to 10% of dairy cows have severe fatty liver and 30 to 40% have moderate fatty liver which indicates that up to 50% of dairy cows are at a higher risk for diseases and reproductive problems.”

G. Bobe, J. W. Young, and D. C. Beitz, 2004 Iowa State U.

ReaShure helps the liver of ALL cows manage fat mobilization and glucose production



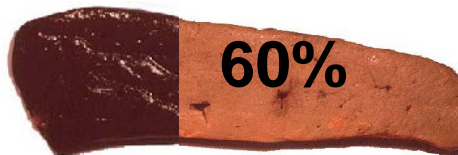


How ReaShure® impacts Liver Fat.

Control



At calving



3 days post calving

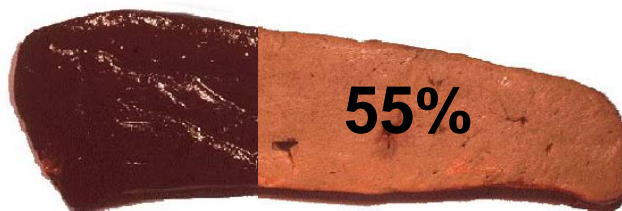


6 days post calving



Recovery in 19 days

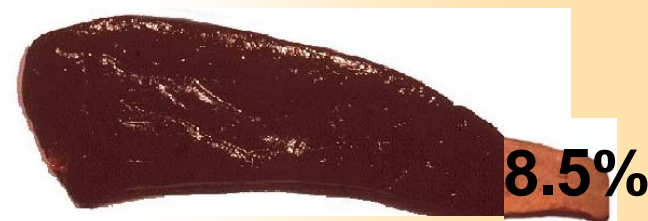
Reashure



At calving



3 days post calving



6 days post calving



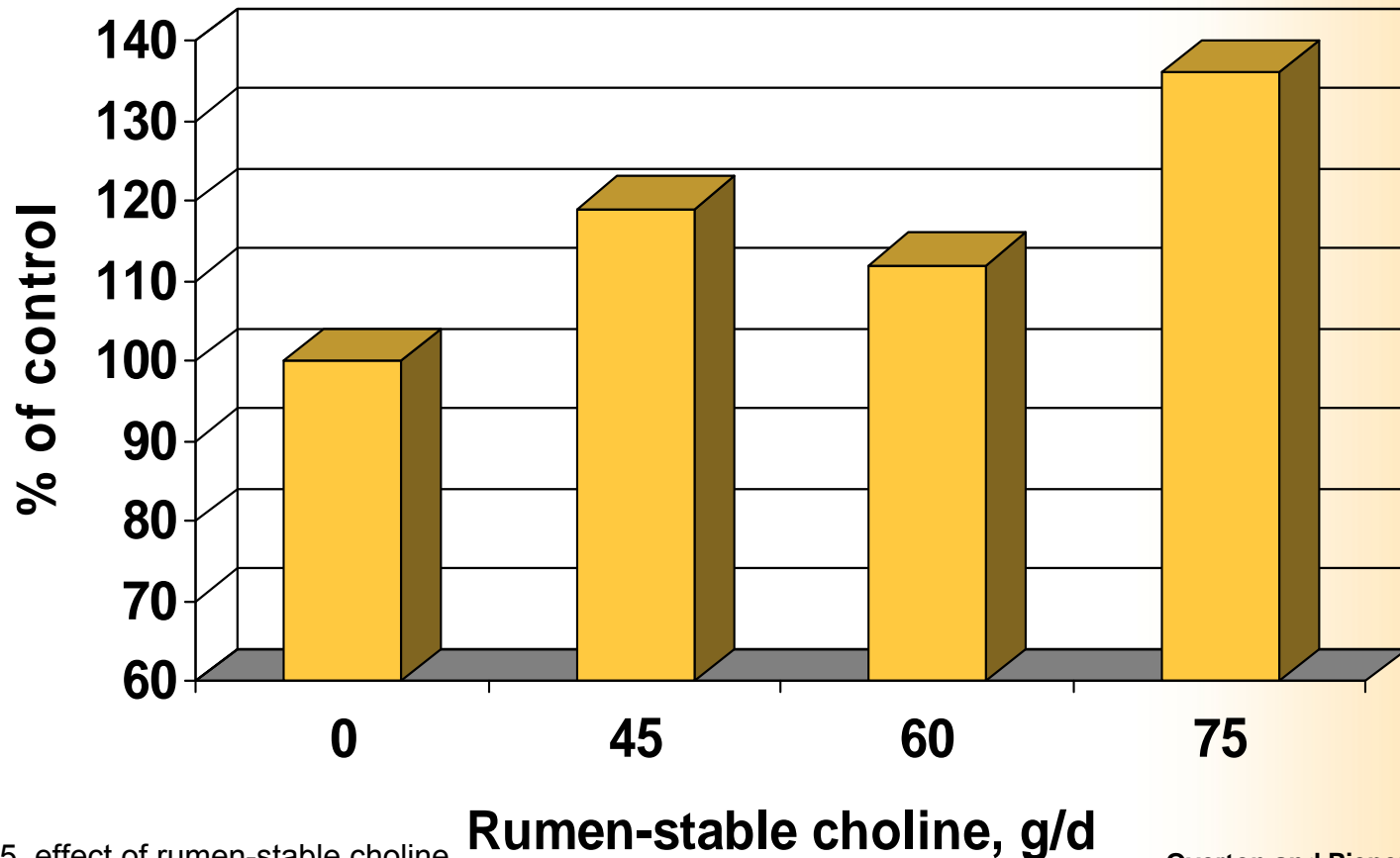
Recovery in 7 days

Legend

Fatty liver

Normal liver

Rumen Protected Choline (ReaShure[®]) supplementation increases rate of glucose production in liver of transition cows^{*,**}

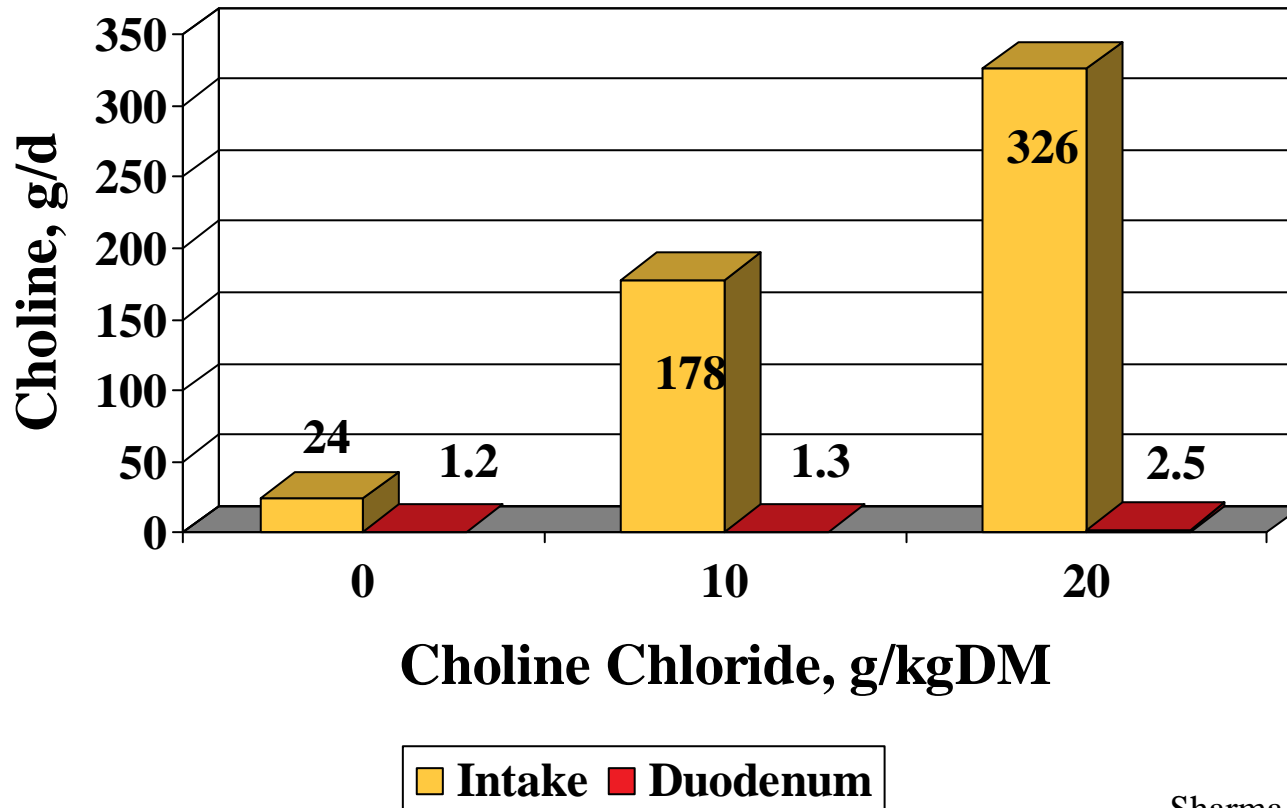


* $P < .15$, effect of rumen-stable choline

Overton and Piepenbrink, 2002

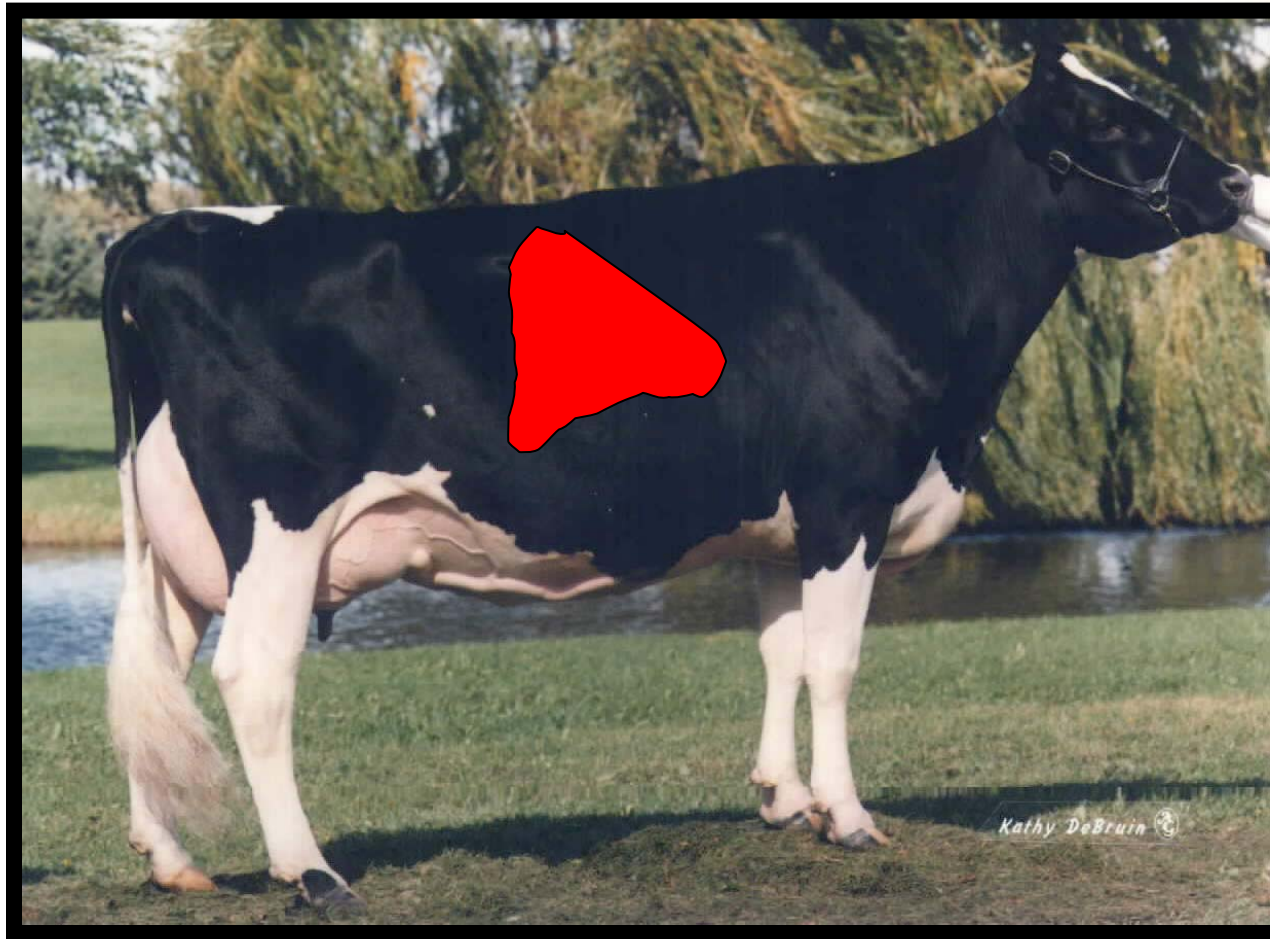
** Measured as conversion of propionate to glucose in liver slices obtained from cows during transition period.

Rumen Protection is the key to delivering choline to cows to support the liver

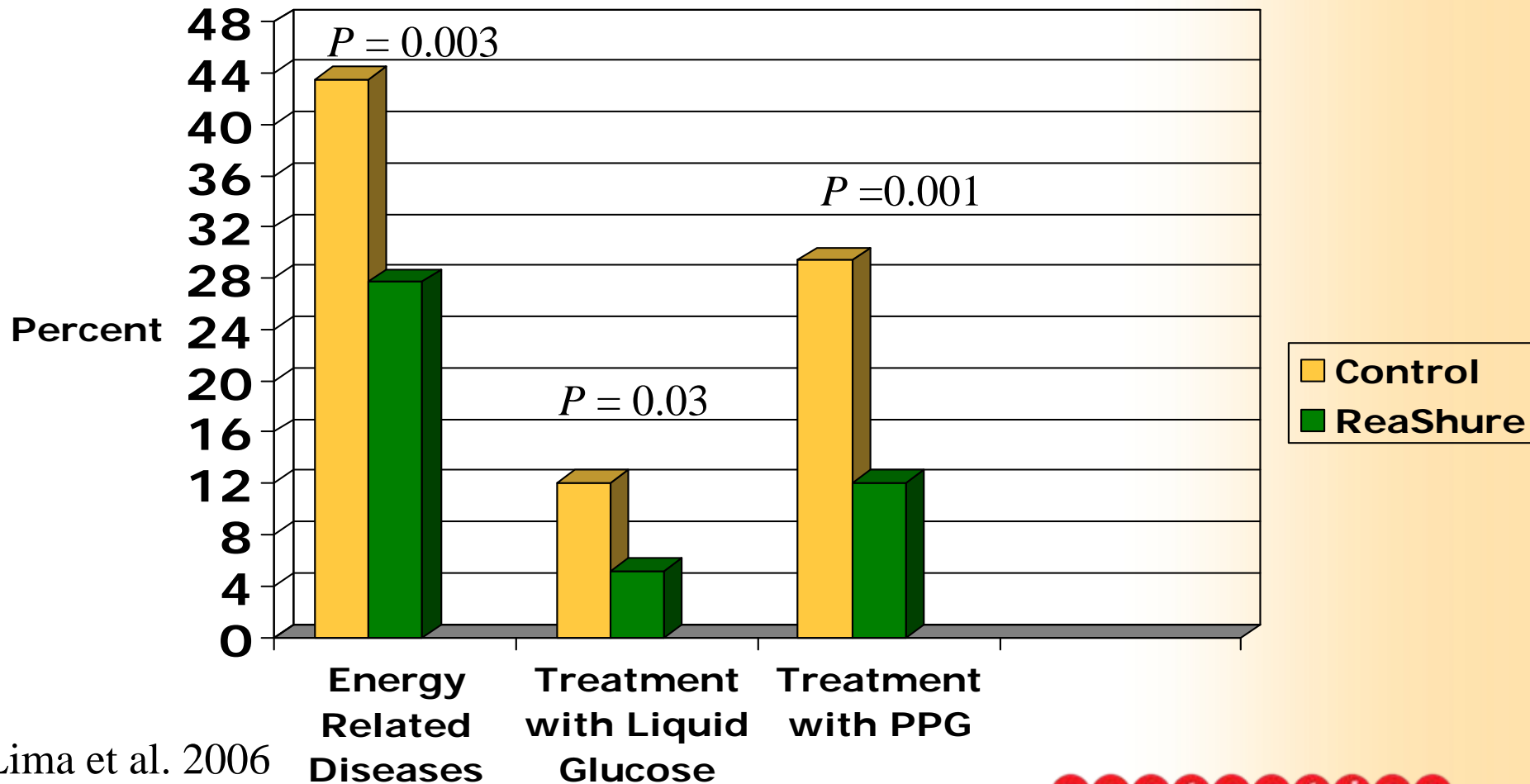


Sharma and Erdman, 1988

Health, Productivity and Fertility are the Benefits of a Healthy Liver



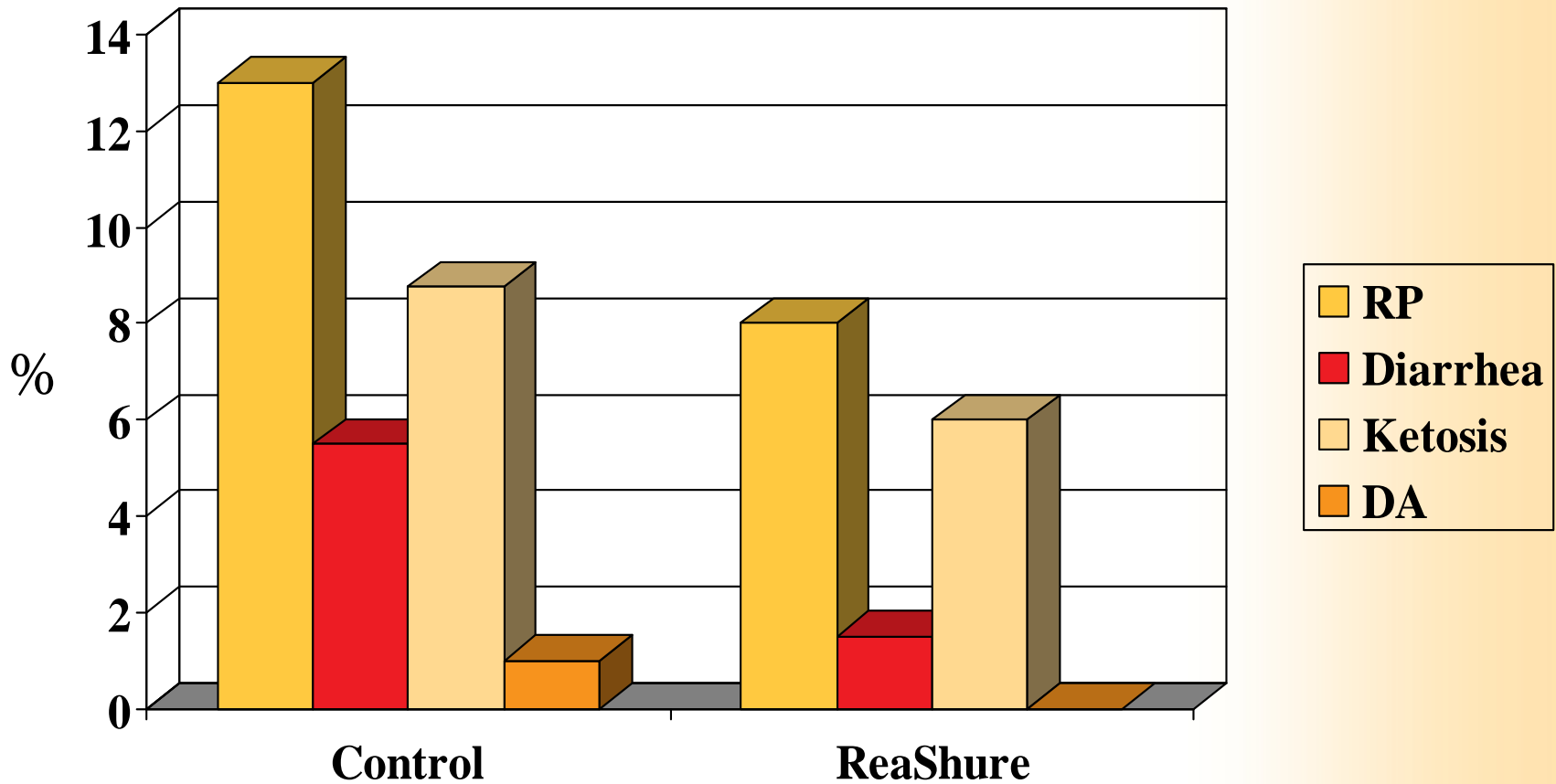
Reashure reduced energy related diseases during the transition period



Lima et al. 2006

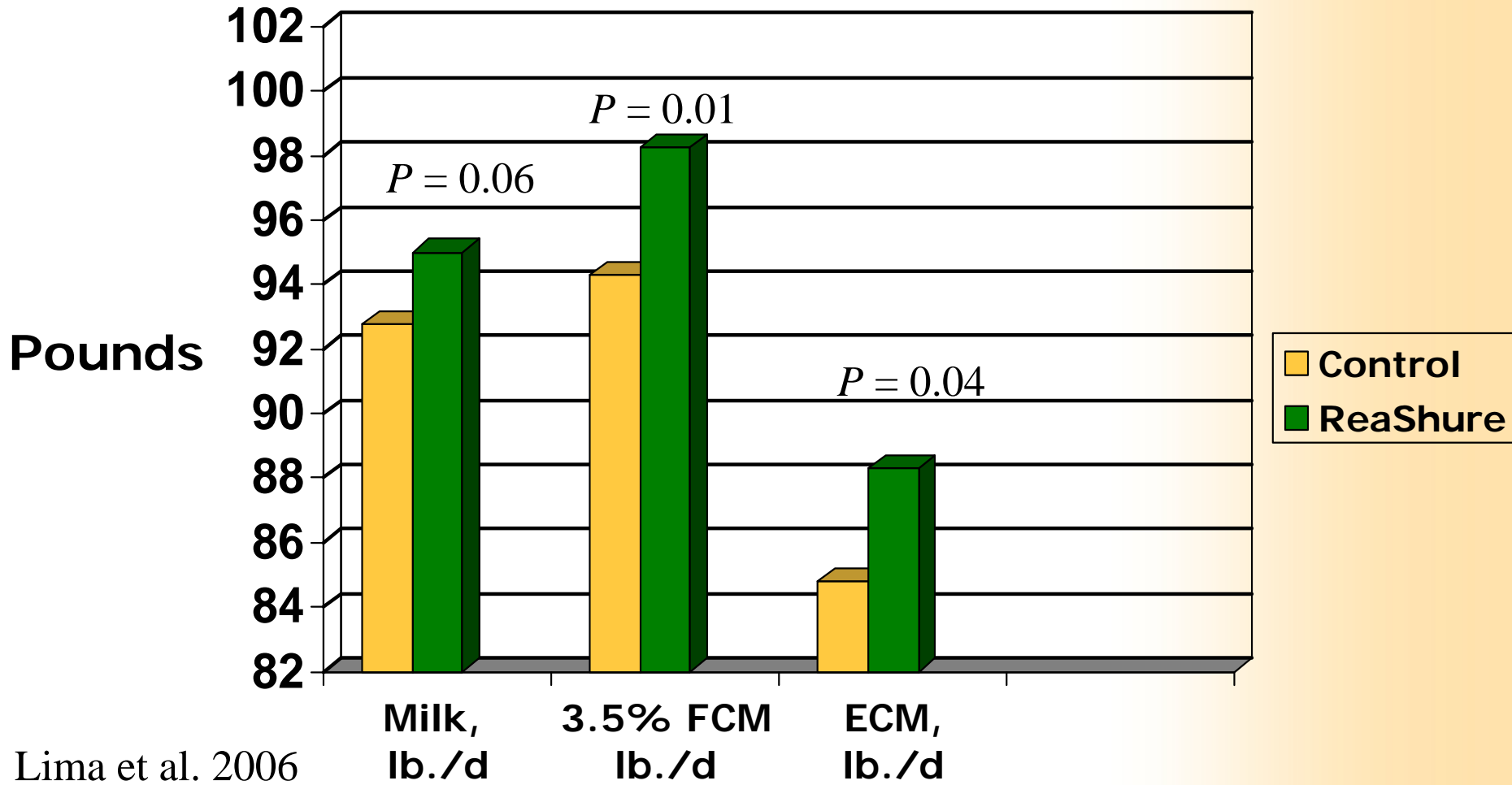


Incidence rates for metabolic diseases in fresh cows



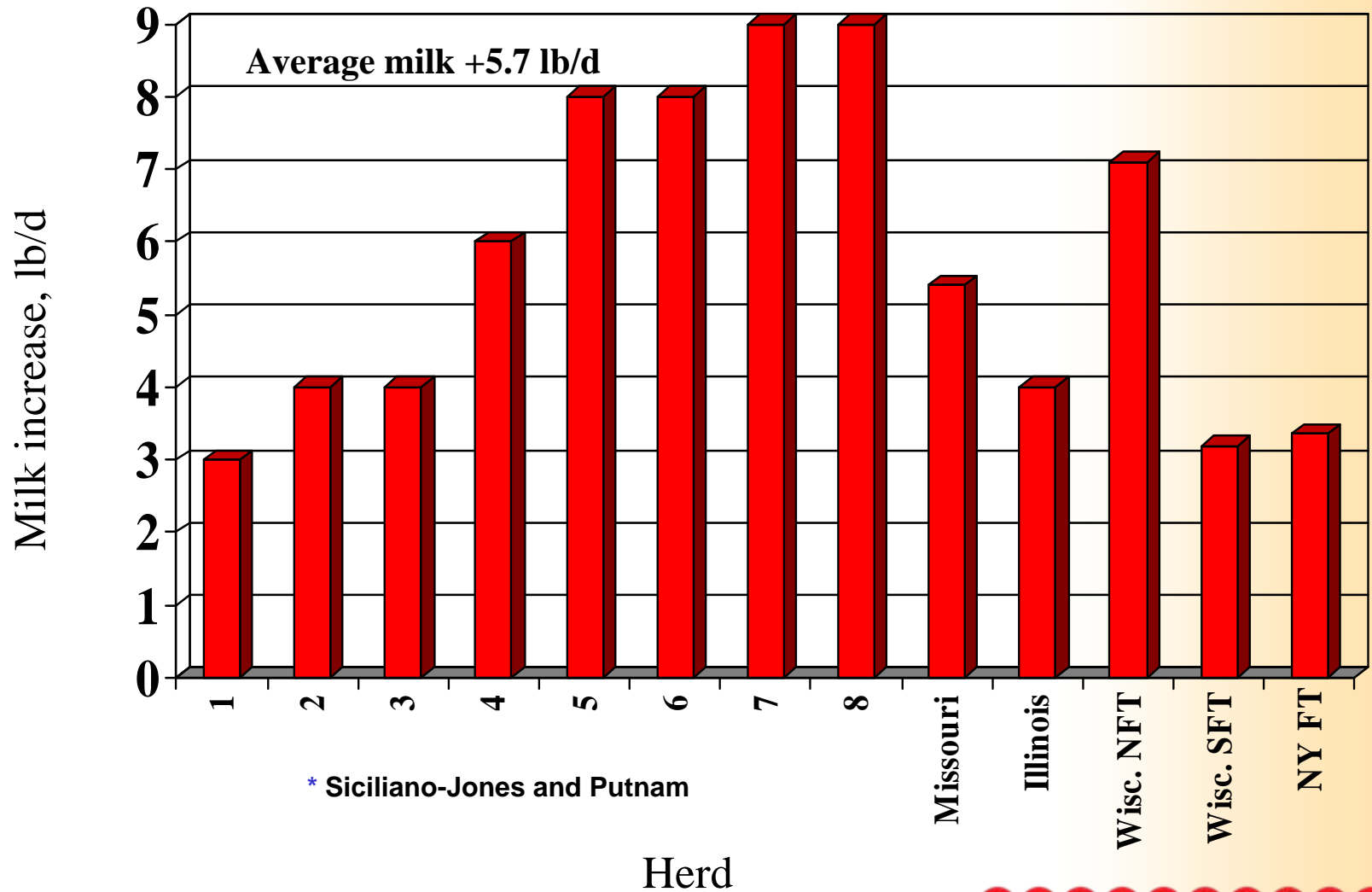
Mexico, 2001

ReaShure Improved Milk, FCM and ECM yield through 80 DIM

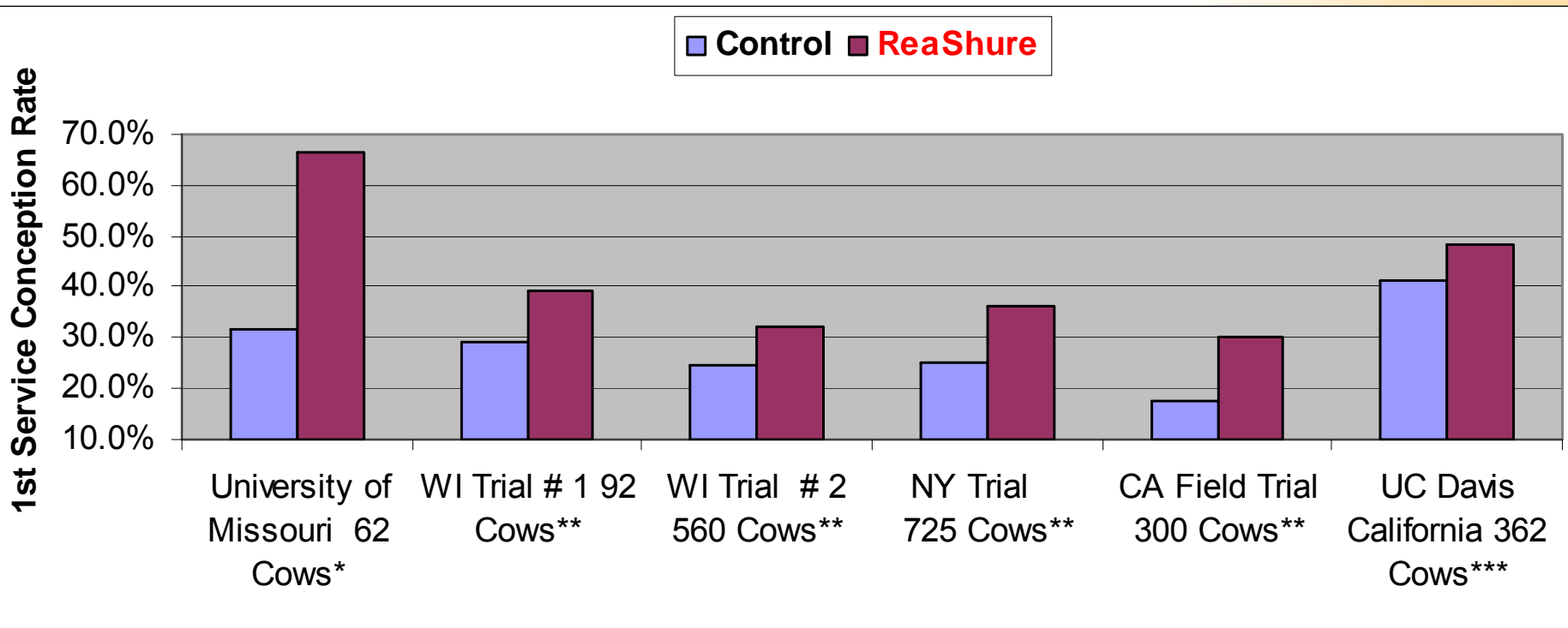


Lima et al. 2006

5.7 lb milk increase on dairies using ReaShure



ReaShure improves 1st Service Conception rates



* Journal of Dairy Science, Vol 87, (Supl.1):334

** Balchem Technical research Reports: 2004:3-5, 2005:2

*** Lima et al 2006 ADSA Abstract

Feeding Recommendations

- Pre-fresh thru fresh cow pen (- 21 to + 21 days of calving) – 2 oz (60 g/day)
 - Optimal response of milk, health, reproduction
- Pre-fresh only (-21 to day of calving)
 - 60 g per day
 - Response in health and reproduction
 - Less response in milk

ReaShure® helps the liver...

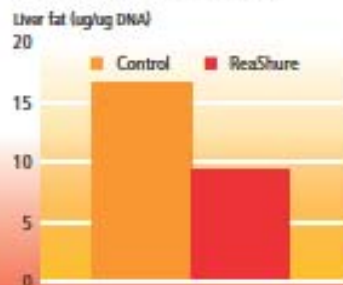
Multiple research studies confirm that rumen-protected choline:

- Helps the liver process energy more effectively which reduces excess fat accumulation in the liver.
- Helps the cow manage her energy status.
- Helps cows manage the energy demands of early lactation.

Every cow is a candidate

Even a small accumulation of fat can decrease the liver's metabolic functions and impact overall energy metabolism in early lactation.

Cows fed ReaShure accumulated 40% less fat in their livers

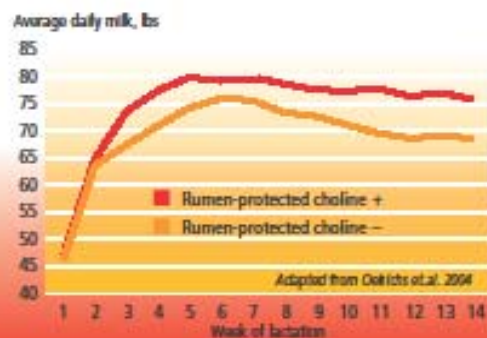


R.E. Cooke, N. Siva Del Rio, D.Z. Carvalheiro, S.J. Berthel, M.H. Ramos, and R.H. Grunzler
Supplemental Choline for Prevention and Alleviation of Fatty Liver in Dairy Cattle
J Dairy Sci 2007 90: 3813-3818

...this creates a long-term improvement in energy status... resulting in improved fertility, productivity and health.

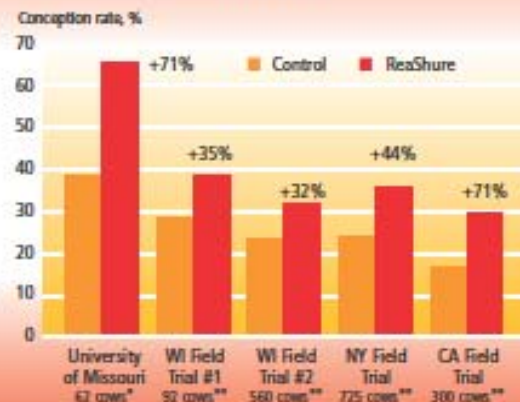
- Efficient glucose production in early lactation helps drive health, milk yield and fertility.
- How well the cow coordinates energy metabolism and generates glucose is a key determinant of milk production and reproductive efficiency.
- Any condition that impairs liver function in the early transition cow impairs the liver's ability to orchestrate energy metabolism and generate glucose. Impaired liver function can lead to subclinical and clinical energy-related disorders such as ketosis, metritis, displaced abomasums and mastitis.

Rumen-protected choline and milk production



Adapted from Oelrichs et al. 2004

Influence of ReaShure on 1st service conception rate



* Journal of Dairy Science, Vol #7, Suppl. 1:384
** Balchem Technical Research Reports: 2009-3-G-2005/2

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Improving animal nutrition and health through *protection nutrition*

