

Affect of Toxic or Novel Endophyte Tall Fescue on Growth and Reproduction

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Fescue Toxicosis Symptoms

Health

- Vasoconstriction (narrowing of blood vessels)
- Fescue foot
- Poor thermoregulation (including heat stress)
- Fat necrosis

Production

- Low feed intake and rate of gain
- Low birth weight and weaning weight
- Low breeding rate
- Dystocia (birthing problems)
- Agalactia (poor milk production)

Fescue foot



© George Garner



Foot DMPLO
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4587d Foot DMPLO
790K: 0.00

Circulation in hoof

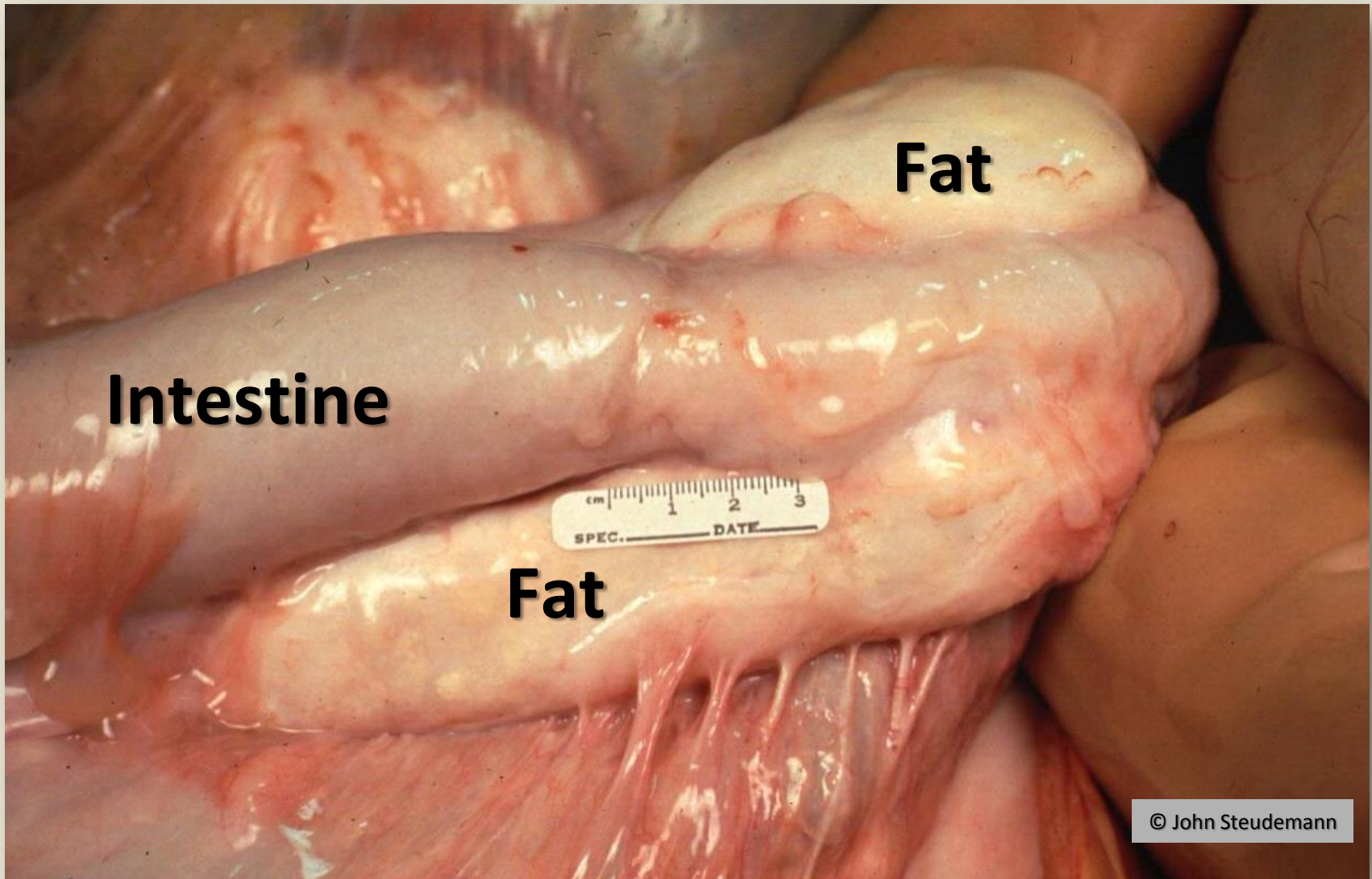
Healthy

Fescue Foot



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Fat Necrosis



© John Steudemann

Lamb Birth Weight

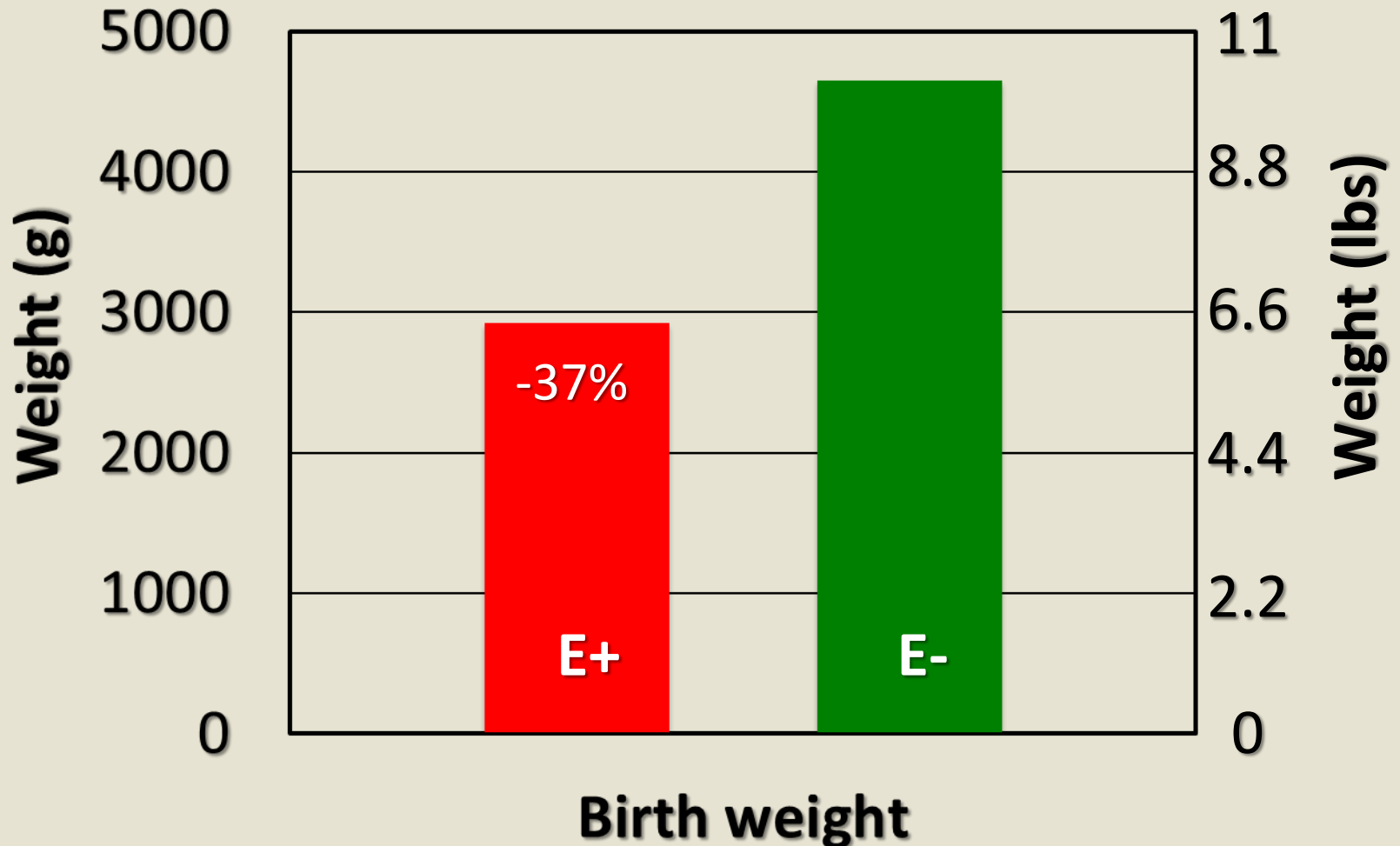


E-



E+

Birth weight of lambs from ewes fed toxic or E- tall fescue seed



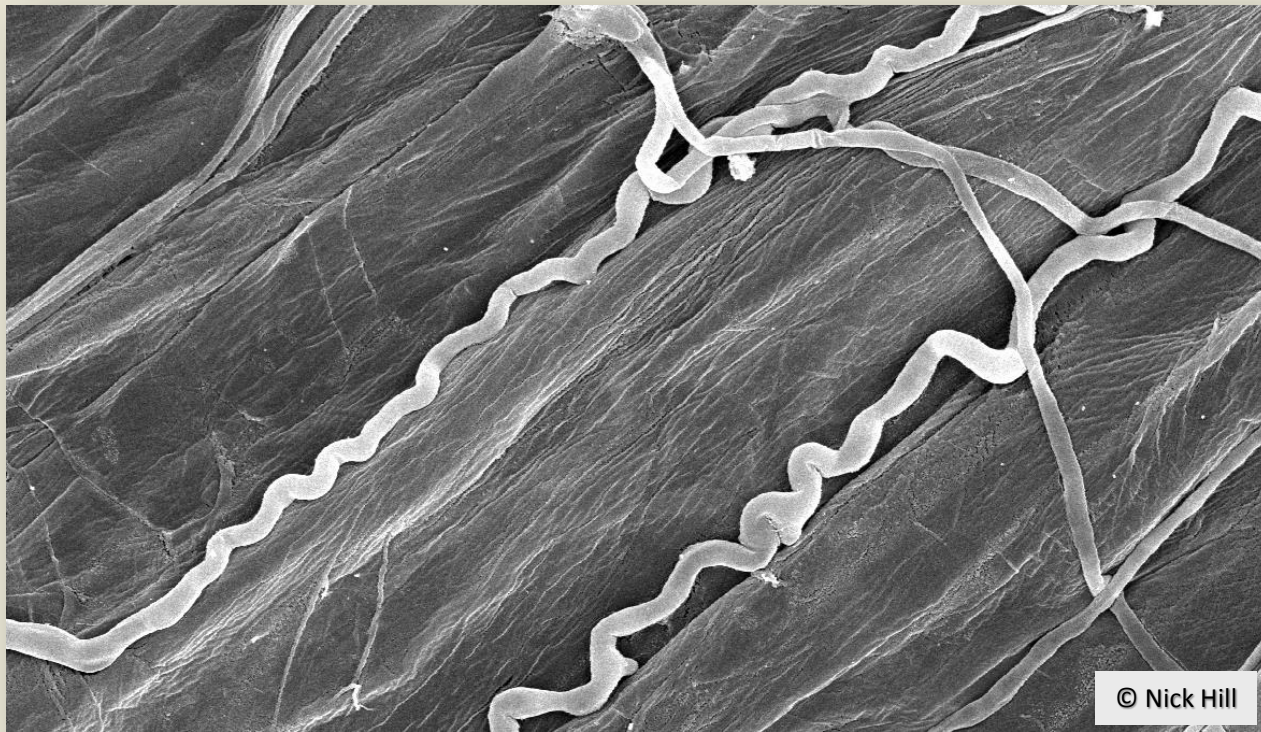
Duckett et al, 2014



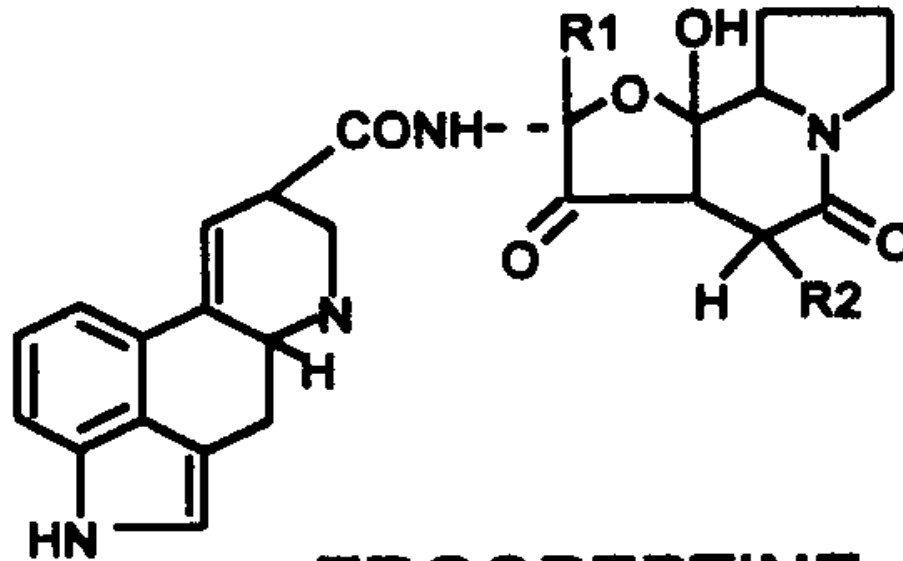
Fescue Toxicosis: The Cause

The Endophyte:

The endophyte grows in tall fescue between the plant cells



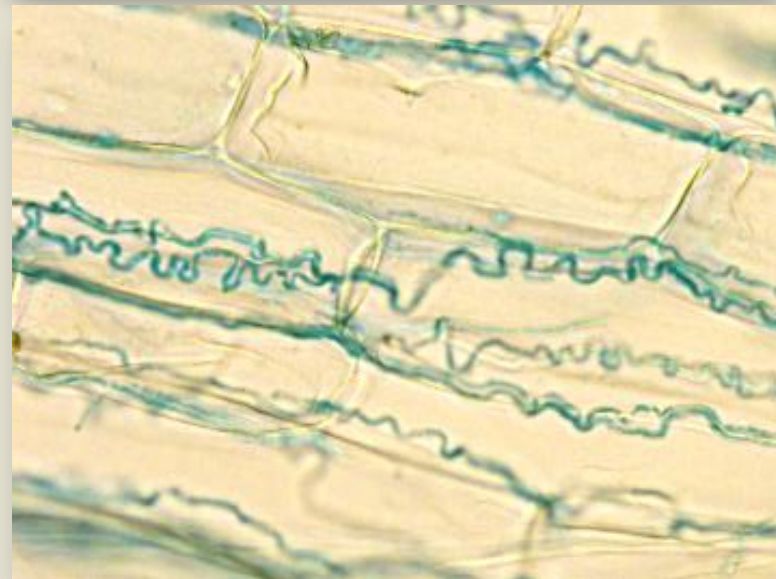
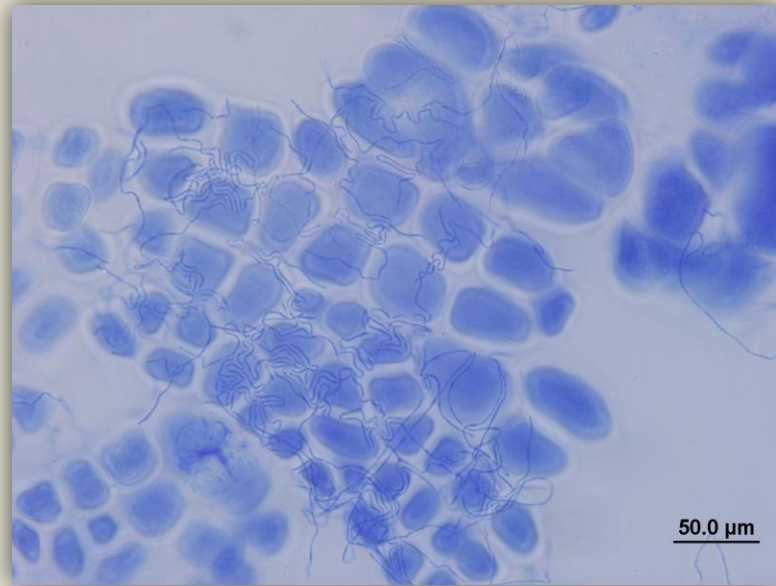
Ergot alkaloid molecules



**ERGOPEPTINE
STRUCTURE**

	R1	METHYL	ETHYL	ISOPROPYL
R2				
ISOPROPYL		ERGOVALINE	ERGONINE	ERGOCORNINE
ISOBUTYL		ERGOSINE	ERGOPTINE	ERGOCRYPTINE
ISOPHENYL		ERGOTAMINE	ERGOSTINE	ERGOCRISTINE

Endophyte location in the plant



Retained winter hair coat

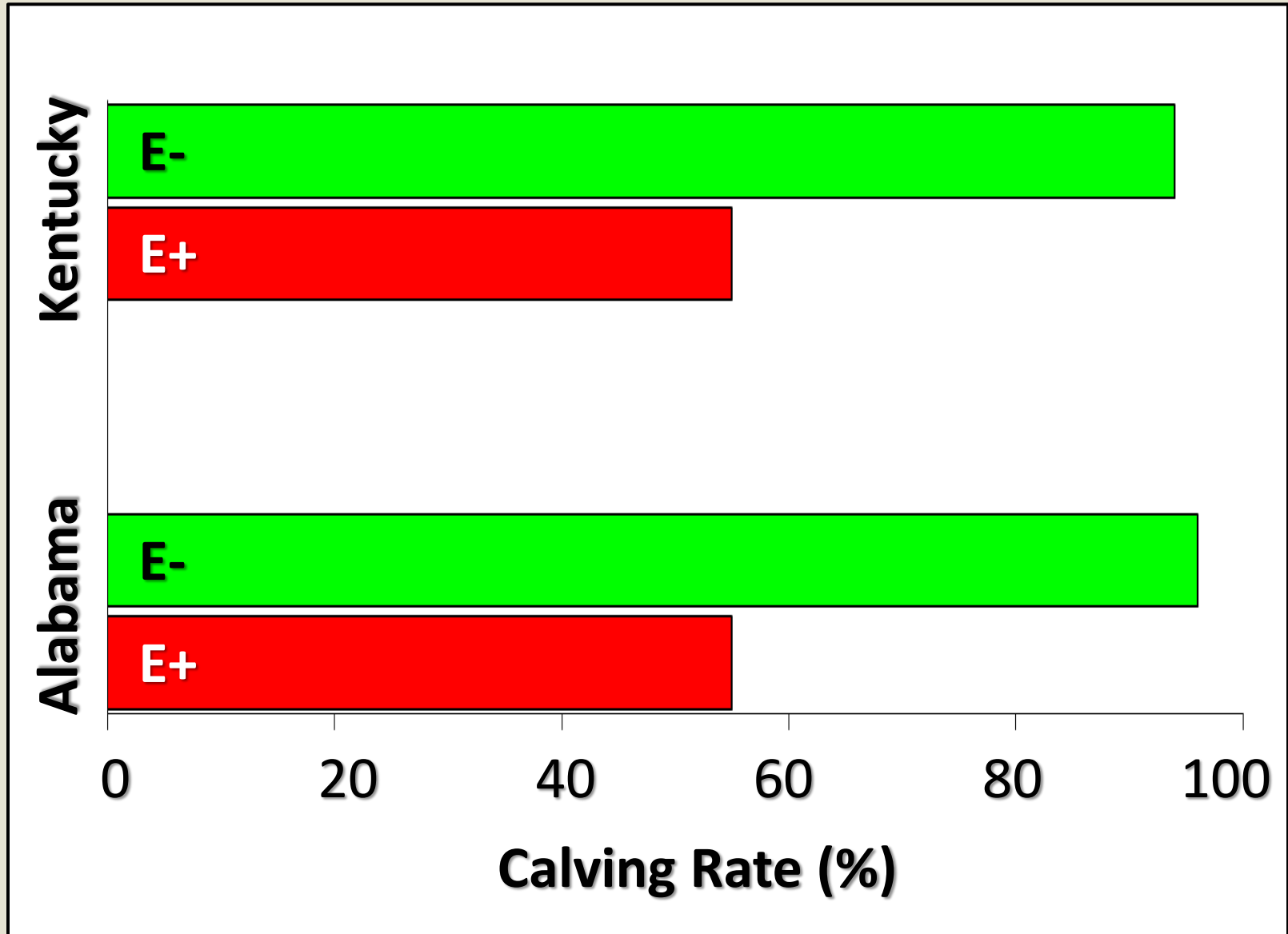


Cattle on KY31 E+ in summer in Missouri

Cattle average daily gains

	E+	E-
	Ib/day	Ib/day
Alabama (grazing)	1.41	2.18
Alabama (seed)	0.44	2.12
Alabama	1.00	1.83
Georgia	1.02	1.31
Missouri	0.97	1.41
North Carolina (heifers)	0.55	1.65
Virginia	1.06	1.47
Texas	0.99	2.14

Calving rate



Schmidt, 1986; Gay, 1988

How Big is the Fescue Problem?

- 8.5 Million Cows
- 35 million acres
- Losses total \$1 Billion!
- What do other big industry issues cost us?
 - Shipping Fever....BRD Complex

\$1 Billion

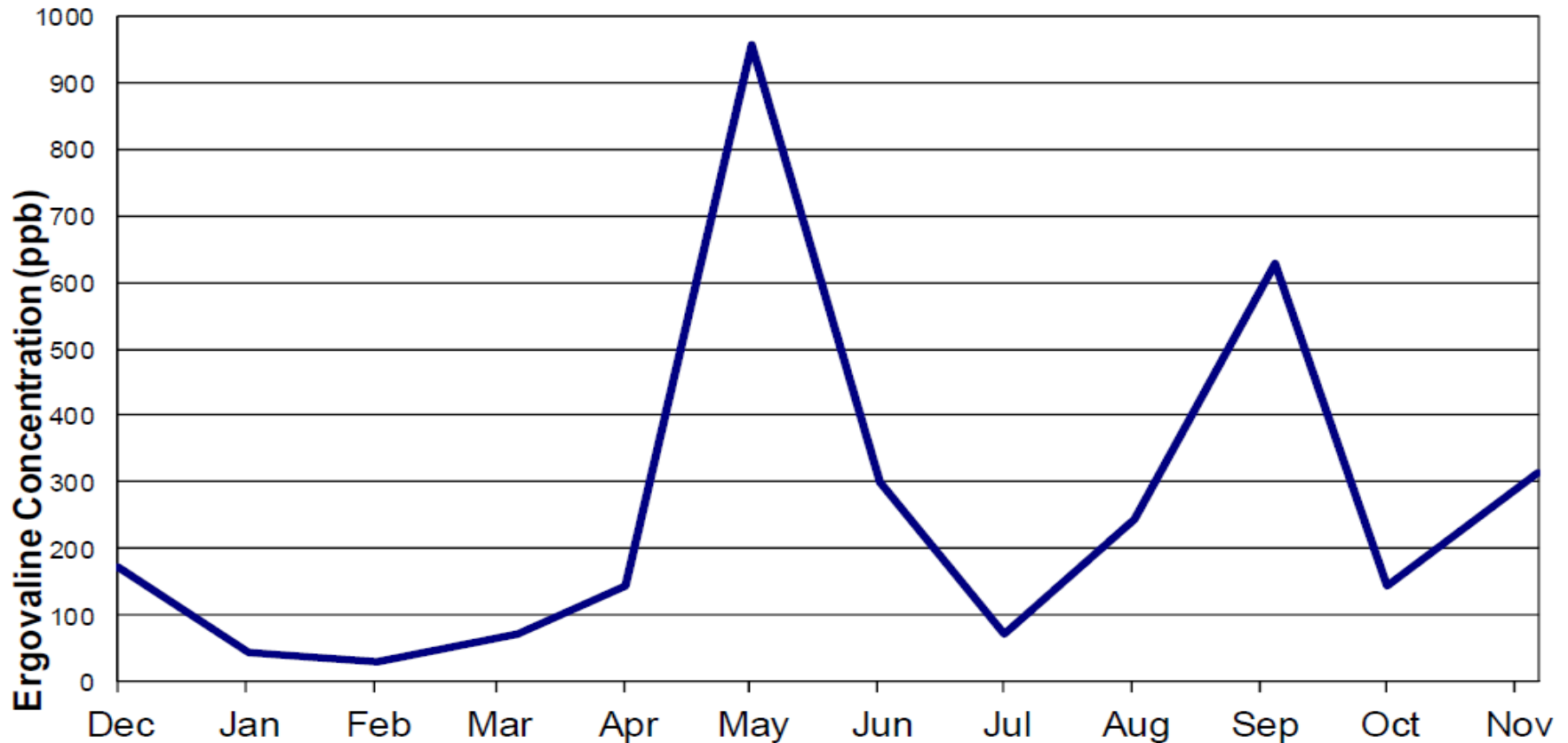
The endophyte provides persistence

Endophyte-free

Endophyte-infected

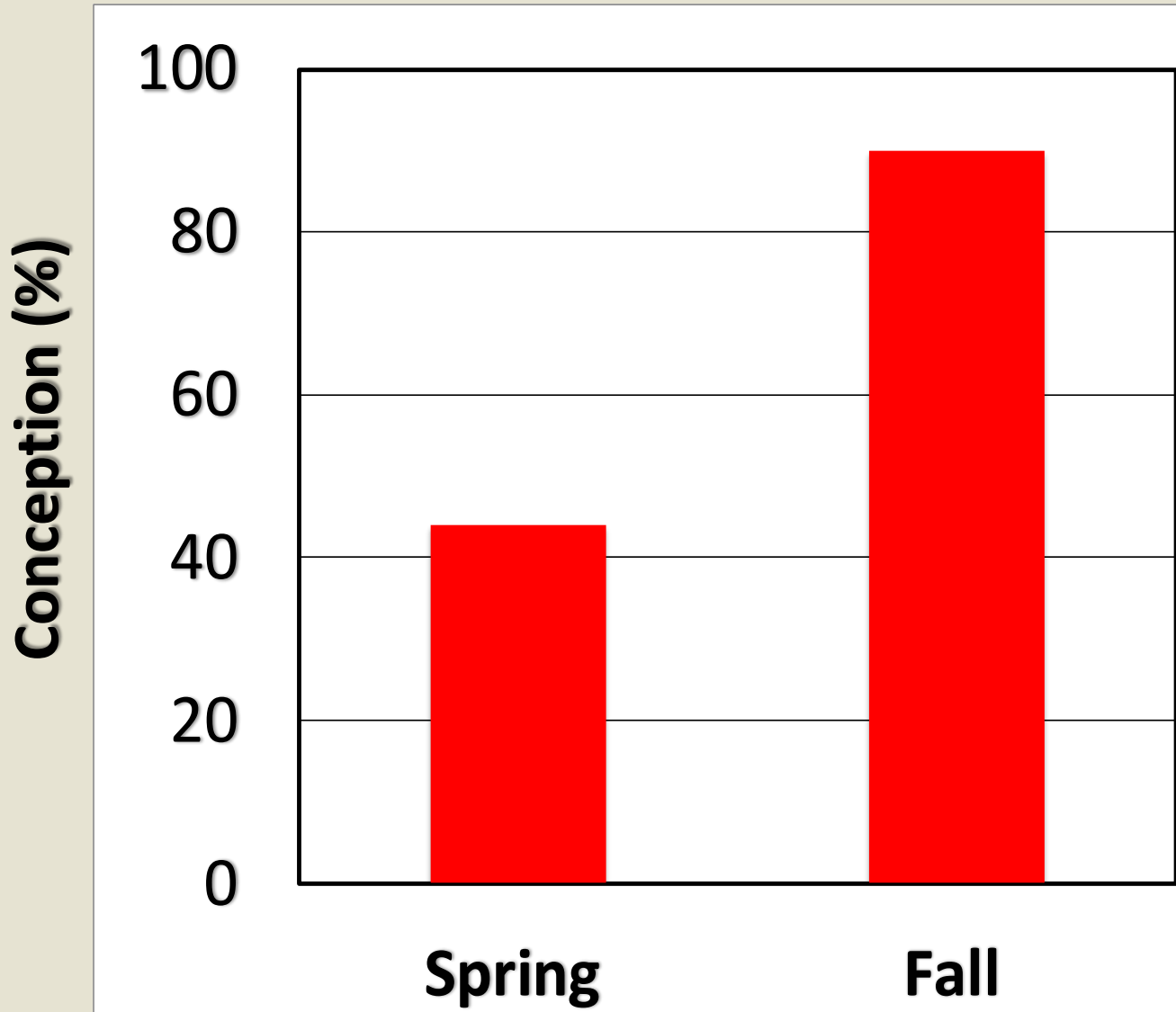
KY31 E+ toxins vary throughout the year

Annual Tall Fescue Ergovaline Concentration Trends



Calving Rates: Spring vs. Fall Calving

KY31 E+



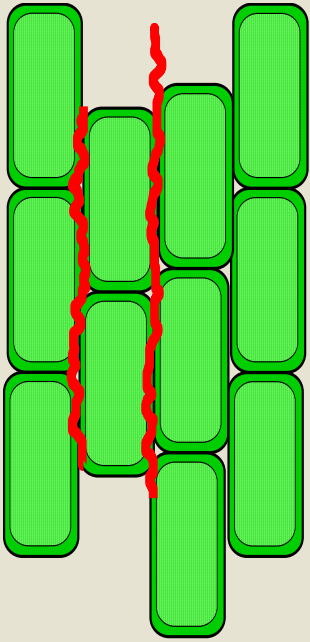
Caldwell et al, 2010



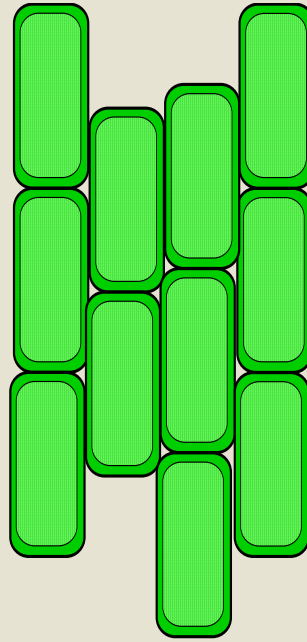
Promising approaches

- Plant-based
 - Suppression/clipping of seed heads
 - Aggressive and adaptive pasture management
 - Novel endophyte varieties
 - Legumes
 - Diversify forage systems (annuals and native warm season grasses)
- Animal-based
 - Fall Calving
 - Genetic markers/selection (hair coat/heat tolerance)
 - Progesterone supplementation
 - Feed through remedies
 - Supplemental feed

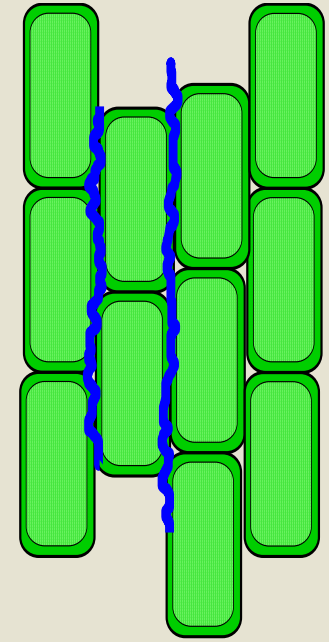
Tall Fescue



Toxic Endophyte
toxicosis
Excellent persistence

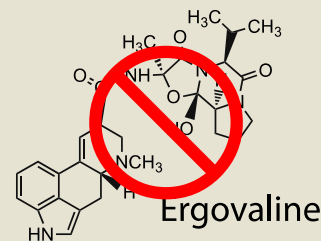
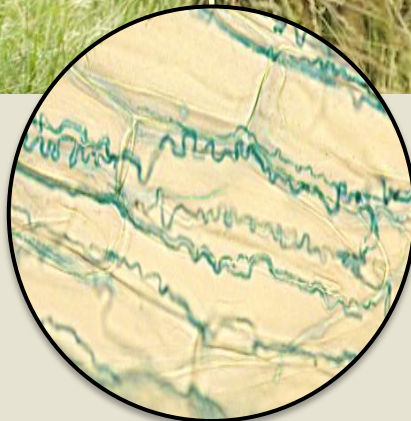
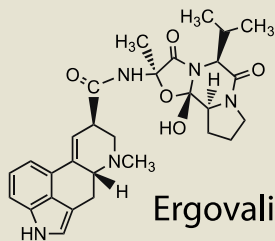


Endophyte-Free
No toxicosis
Poor persistence



Novel Endophyte
No toxicosis
Excellent persistence

What a difference a strain can make!



What

- Increased (lb/day)
- Increased
- Increased (up to 90)
- Improved
- Reduced
- Improved
- More car



For Us?

1
)
5 COWS

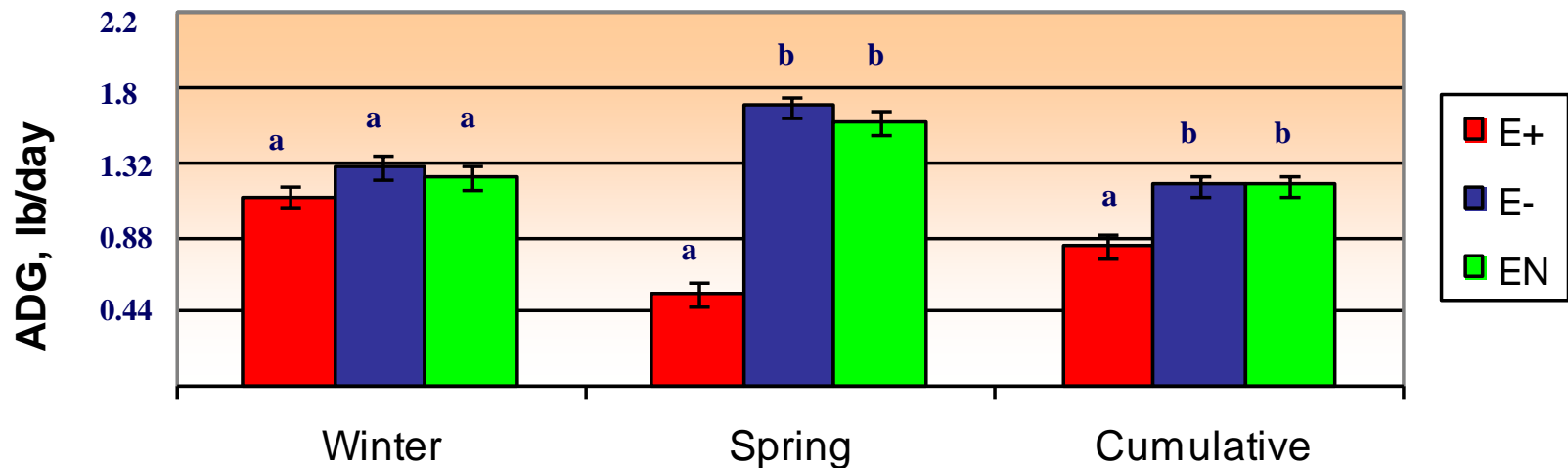
r cattle

Growing cattle performance, forage quality and stand persistence of Jesup tall fescue in a stockpiling system

- Stands of Jesup tall fescue with no endophyte, or with wild type or non-toxic (AR542) endophytes were established in 1999.
- Stands were winter stockpiled in 5 consecutive growing seasons and grazed using frontal strip-grazing management.
- Summer growth was harvested for hay.
- Spring growth was grazed in 3 of 5 years.

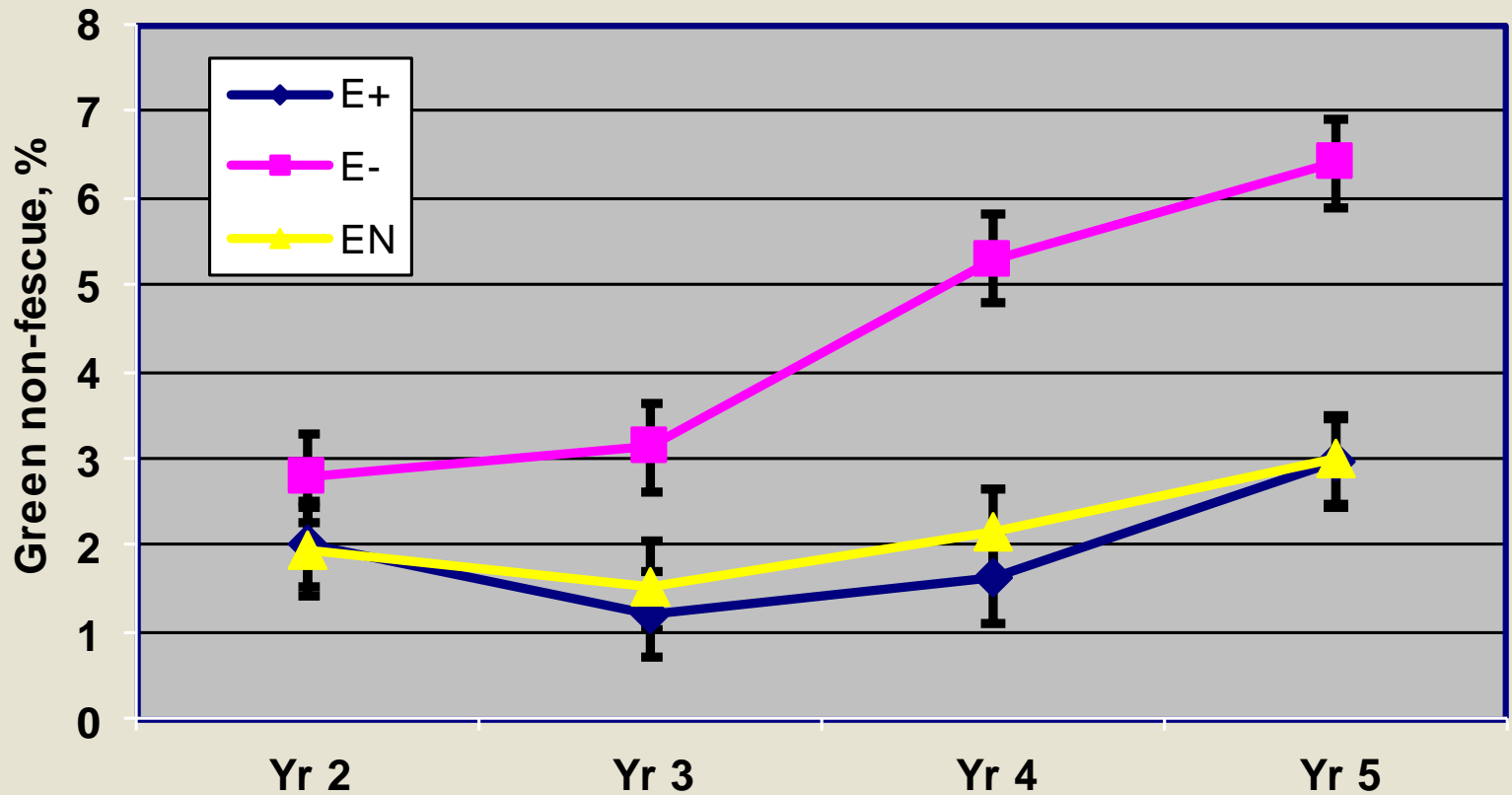
Performance of heifers grazing fescue varying in endophyte status during winter and spring, Drewnoski et al., 2009

Growth performance of heifers consuming fescue with varying endophyte status

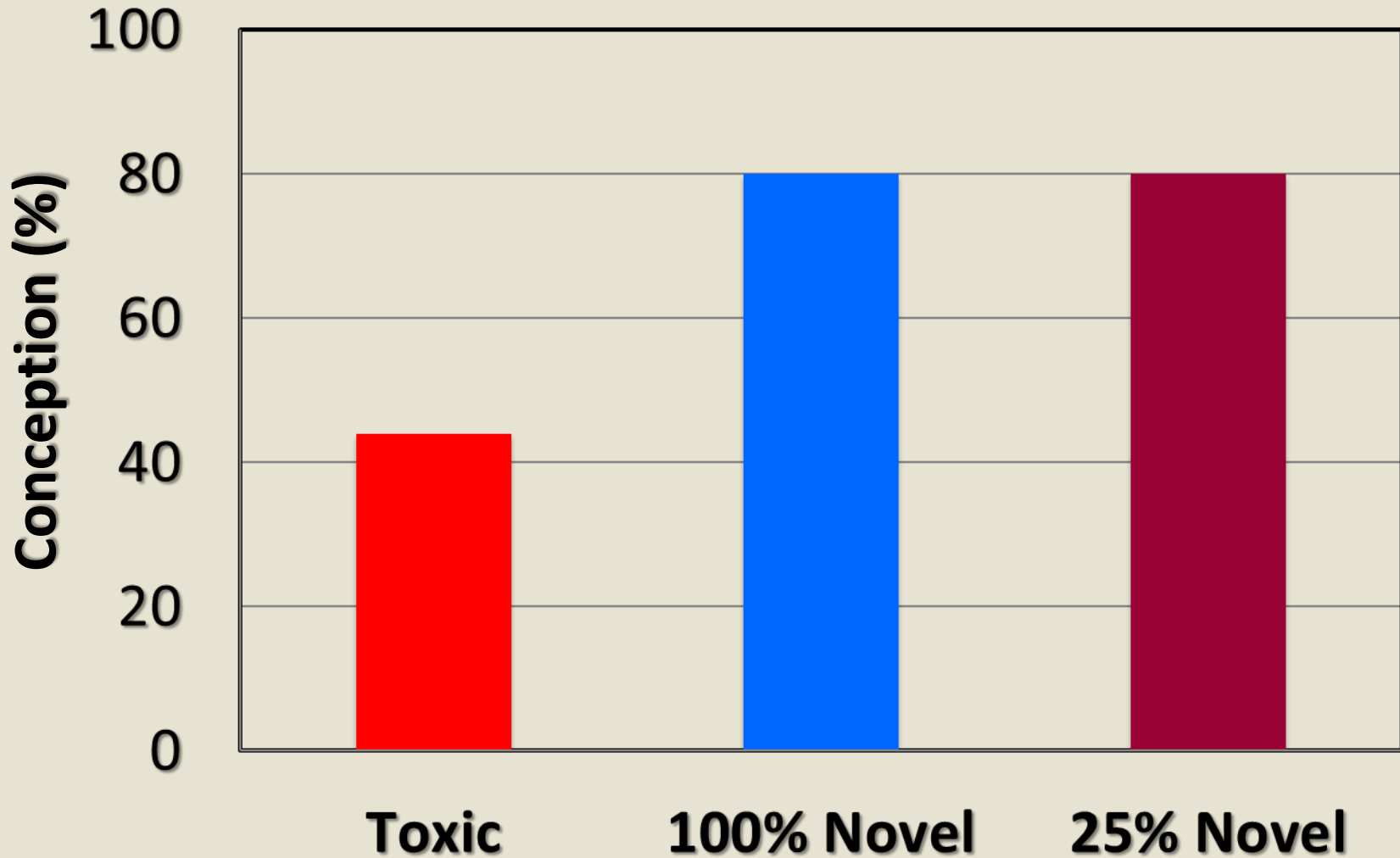


a, b, c $P < 0.05$

Percent green non-fescue in stockpiled fescue sward



Calving Rates: Spring Calving



Caldwell et al, 2010

Will It Pay to Convert Pastures?

- Pasture conversion is expensive
- Improvement in animal performance will eventually pay for conversion
- Time to breakeven will be impacted by several factors

Key Drivers of Renovation Economics

- **Stocking rate**
- **Cattle performance improvements**
 - **Calf weights**
 - **Potential improvement in breeding rate**
 - **Potential improvement in calf crop survival**
- **Is pasture at its yield potential?**
- **Does all acreage need to be renovated to achieve benefits of novel fescue?**

Do Pastures Need Renovation?

Summer

Spring



Novel Endophyte Technology



Tall Fescue + **Toxic** Strain



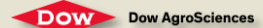
Fescue Toxicosis

- Animal Health
- Livestock Production
- \$1 Billion loss (cattle)



Tall Fescue + **Novel** Strain

Alliance for Grassland Renewal



2020 Tall Fescue Renovation Workshops

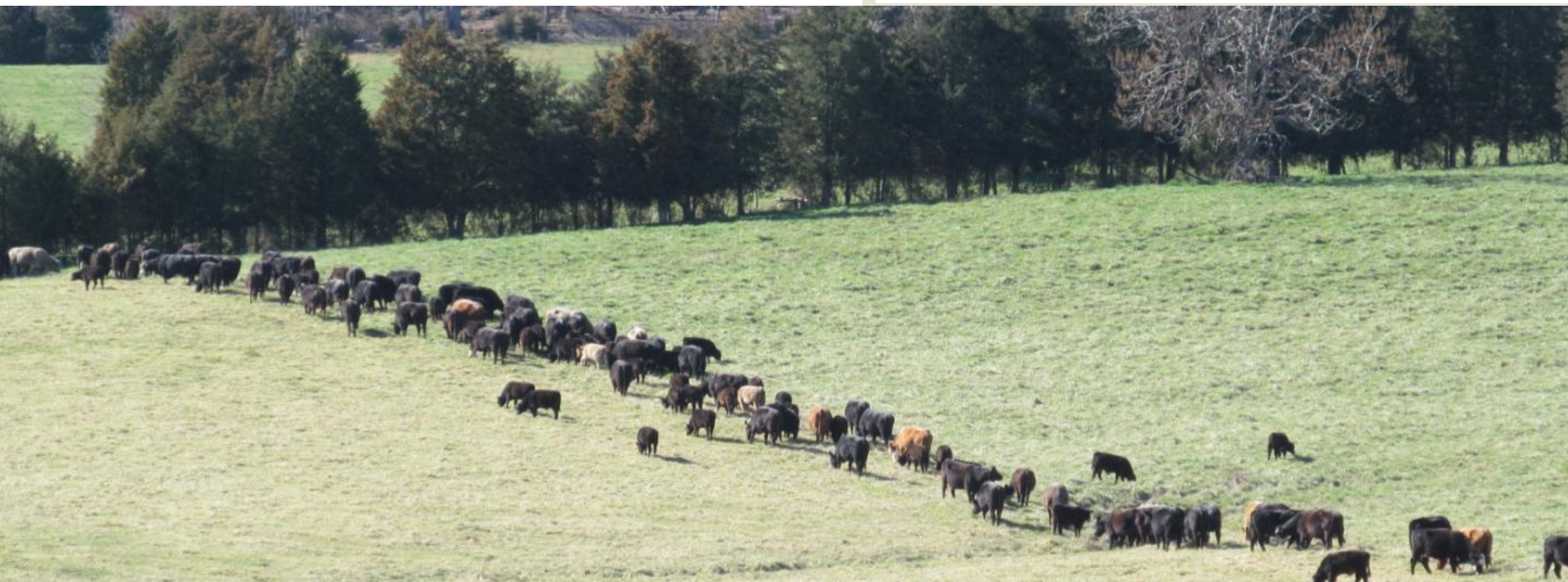
- **Middleburg, VA** **March 10**
- **Hickory, NC** **March 12**
- **Athens, GA** **March 16**
- **Springhill, TN** **March 18**
- **Lexington, KY** **March 19**
- **Harrison, AR** **March 24**
- **Mt. Vernon, MO** **March 25**



Amazing Grazing

NC STATE UNIVERSITY'S
Pasture-Based Livestock Education Program

NC Choices



NC STATE

EXTENSION

CEFS



NCSU | NCA&TSU | NCDA&CS

North Carolina Division of
SOIL & WATER
CONSERVATION

NRCS
Natural Resources
Conservation Service



The North Carolina
Cattle Industry
Assessment