Do weeds reduce forage quality?





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Why manage weeds in forages?

1. Risk of establishment failure
2. Reduce biomass of forage
3. Reduce forage quality
4. Reduce palatability/intake
5. Affect animal health
   - Poisonous plants
6. Affect performance
   - Changes flavor of milk/meat

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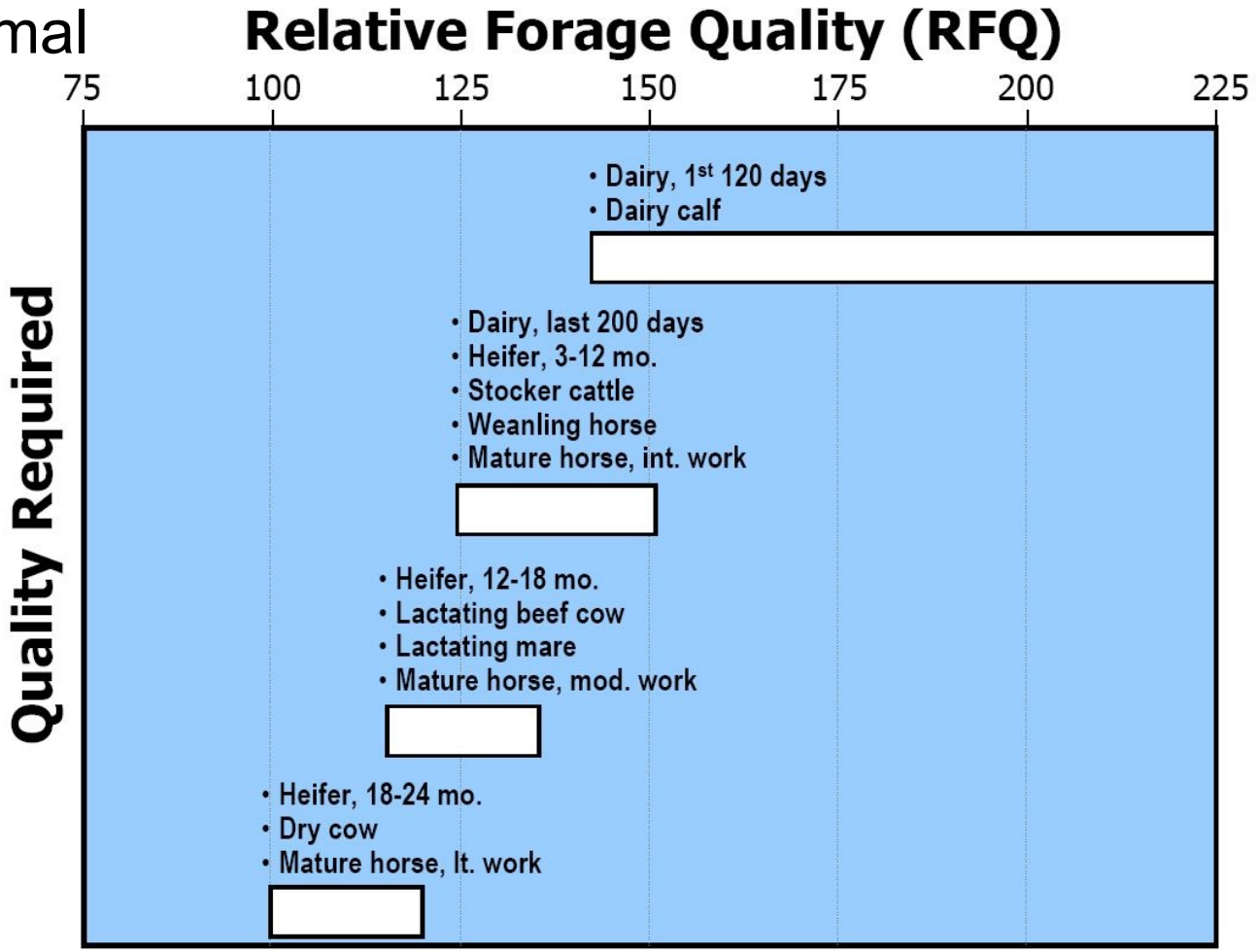
Forage Quality

- Requirements differ based on
  - Type of performance (e.g. milk/meat)
  - Type of animal

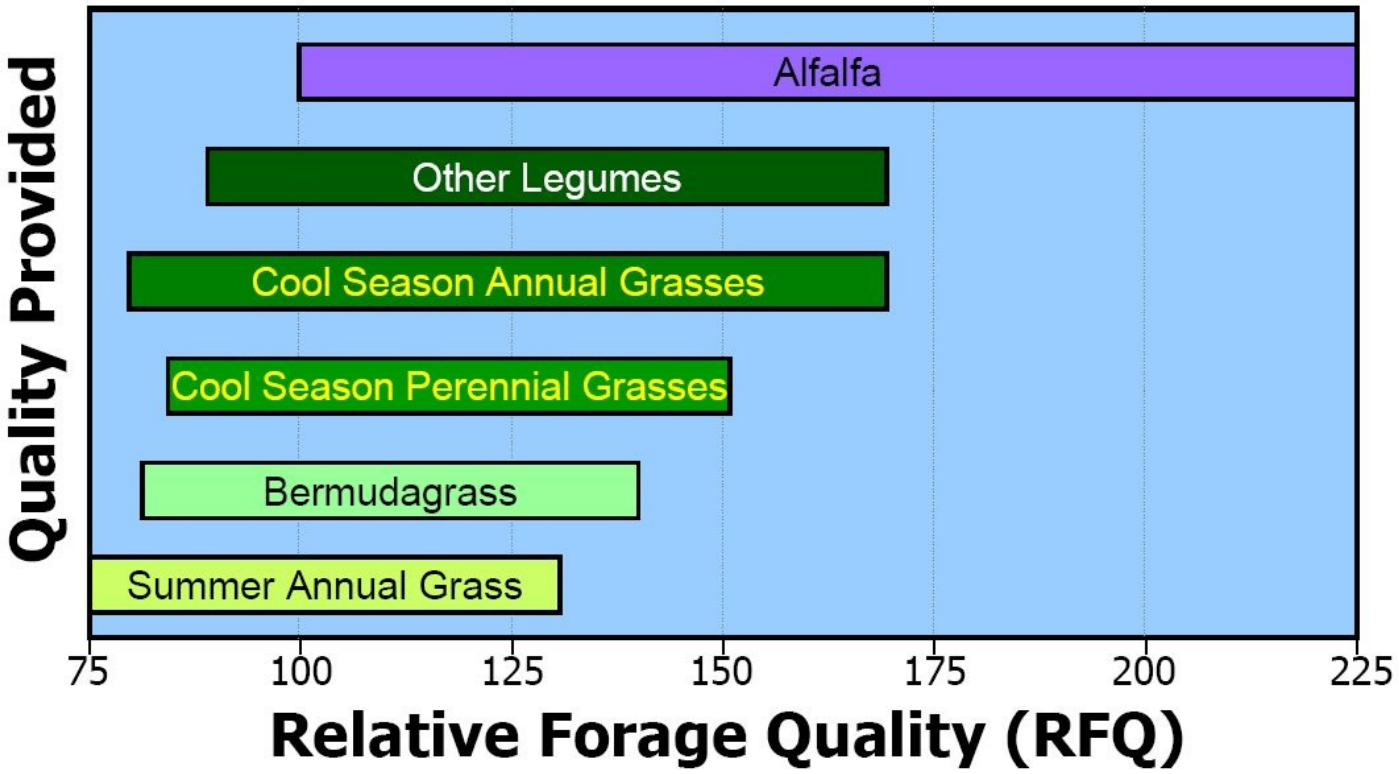
Dairy >150

Cow/Calf pair > 120



Forage Quality

- Dependent on
  - Forage species
  - Time of harvest (stage of development)



Some weeds *can* have high forage quality

1. **"Canada thistle** has forage quality that is equal to superior than alfalfa"
   - Neil Martin, former director USDA-ARS Dairy Forage Research Center

2. "As long as alfalfa fields are well managed **dandelions** will not cause any decline in forage yield or quality"
   - Jerry Doll, Emeritus Weed Scientist, UW-Madison

Forage quality of annual weeds

Species	Invitro digestible dry matter (IVDDM)	Acid detergent fiber (ADF)	Crude protein (CP)
	%		
Alfalfa	**72**	**24**	**27**
Redroot pigweed	73	21	25
Common lambsquarters	68	22	25
Common ragweed	73	25	25
Yellow foxtail	69	30	20
Giant foxtail	62	33	18
Barnyardgrass	70	33	18

- Annual broadleaf weeds similar to alfalfa
  - Forage quality decreases rapidly as they mature
- Annual grasses have less CP, more ADF

Impact of Common Weeds on Forage Quality

ANNUAL WEEDS

SERIOUS	MODERATE	SLIGHT
YELLOW FOXTAIL	GREEN FOXTAIL	COMMON RAGWEED
GIANT FOXTAIL	VELVETLEAF	PIGWEED SPECIES
GIANT RAGWEED	SHEPHERD'S PURSE	
SMARTWEEDS	PENNYCRESS	
COCKLEBUR	LAMBSQUARTERS	
NIGHTSHADES	WILD MUSTARD	

PERENNIAL WEEDS

CURLY DOCK	CANADA THISTLE	DANDELION
HOARY ALYSSUM	QUACKGRASS	WHITE COCKLE
YELLOW ROCKET		

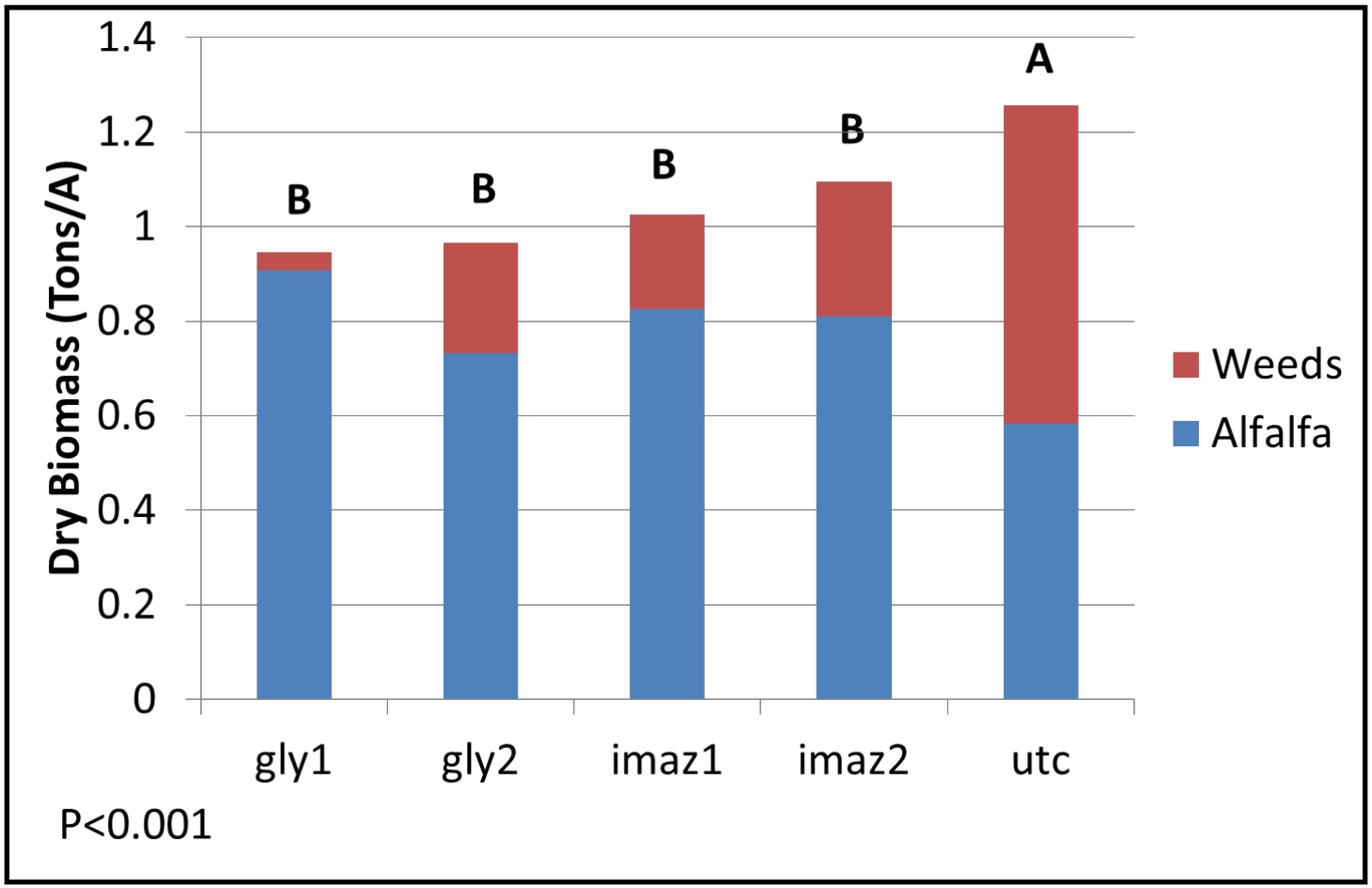
See A3646 page 197

Examples of weed impacts on forage quality

- ALFALFA
  - Establishing vs established stands
- PASTURES
  - 3 sites that vary in productivity

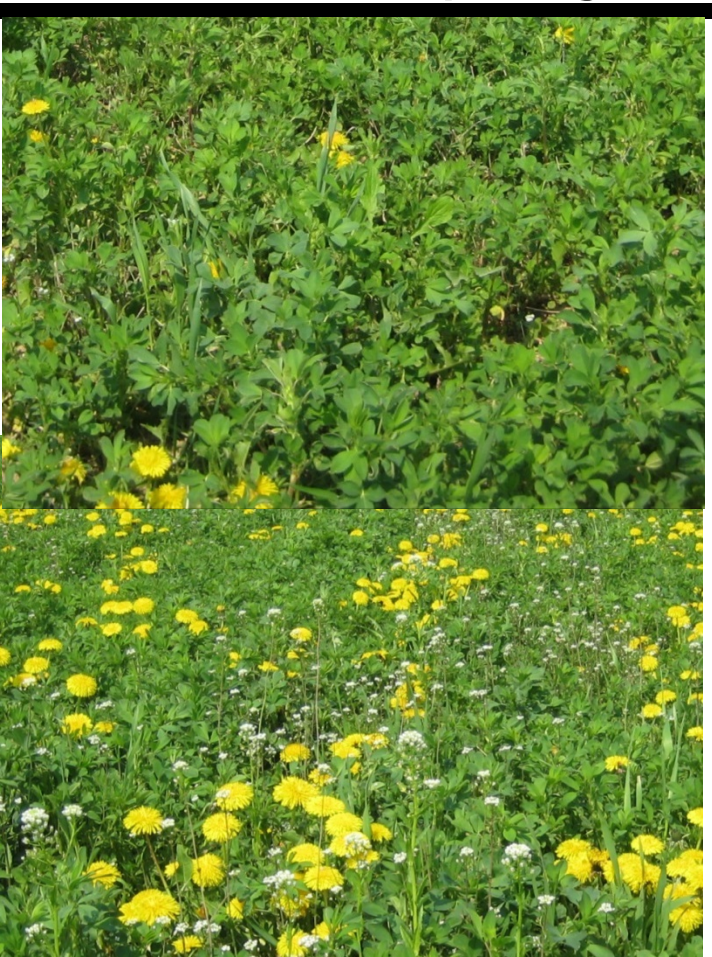
- Impacts on productivity
- Resulting RFQ
- Utilization

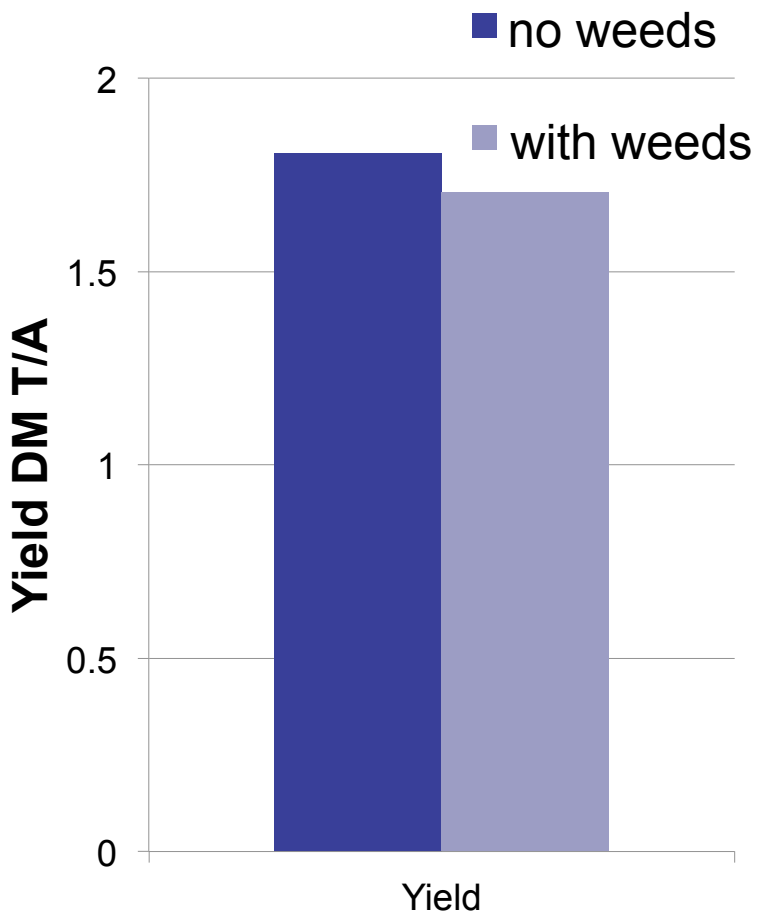
Effect of weed management on alfalfa yield in 1st cut in establishment year



Fall herbicide treatment to control broadleaf weeds in established alfalfa

Spring after treatment forage yield





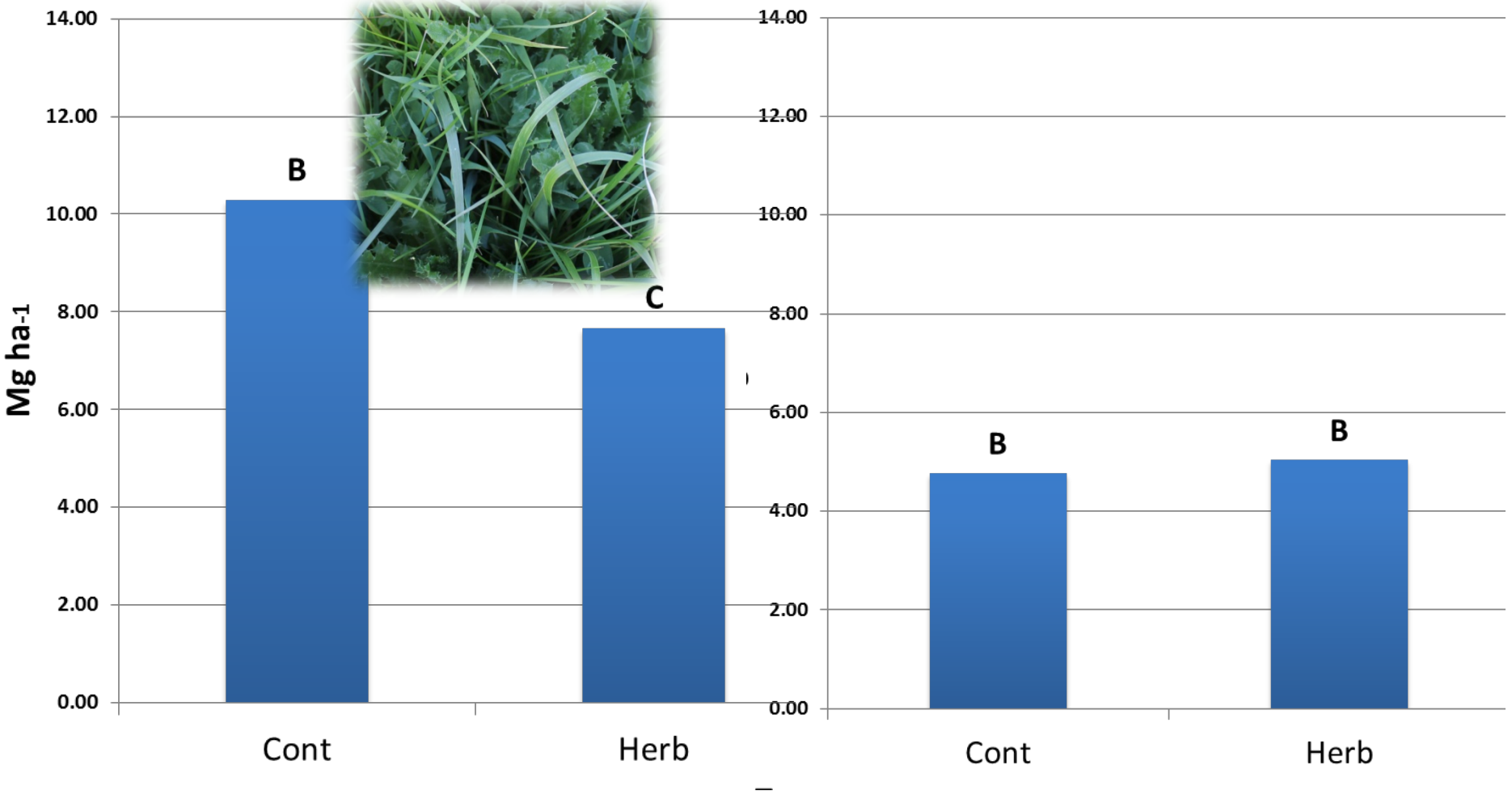
Herbicide treatment to control quackgrass in established alfalfa

If stands are above threshold no difference in forage yield!

Kerb	Yield	Control of quackgrass
Lbs/A	T/A	% control
0.00	3.0	0
0.75	3.0	74
1.5	2.9	85

Pasture examples

Lancaster *vs* *Prairie du Sac*



Summary of weed impact on forage productivity

- Alfalfa
  - During establishment
    - highest yield in untreated weedy fields
  - Established alfalfa
    - No differences in yield >90% of the time
- Pastures
  - Yield can be reduced when weeds controlled
    - Legumes and weeds are eliminated

Weed impacts on forage quality

- Dependent on the
  - **weed species**
  - **stage of development of weed**
  - **Percentage of weed in forage**

Forage Quality Effects from Weeds in 1st cut of Establishing Alfalfa

Relative Forage Quality

	Dane	Jack	Clark
% Weeds in UTC forage biomass	10 %	45%	85%
gly1	137	146 a	185 a
gly2	122	148 a	124 c
imaz1	127	153 a	161 ab
imaz2	127	157 a	150 bc
utc	130	124 b	153 abc
Prob.	NS	P<0.05	P<0.05

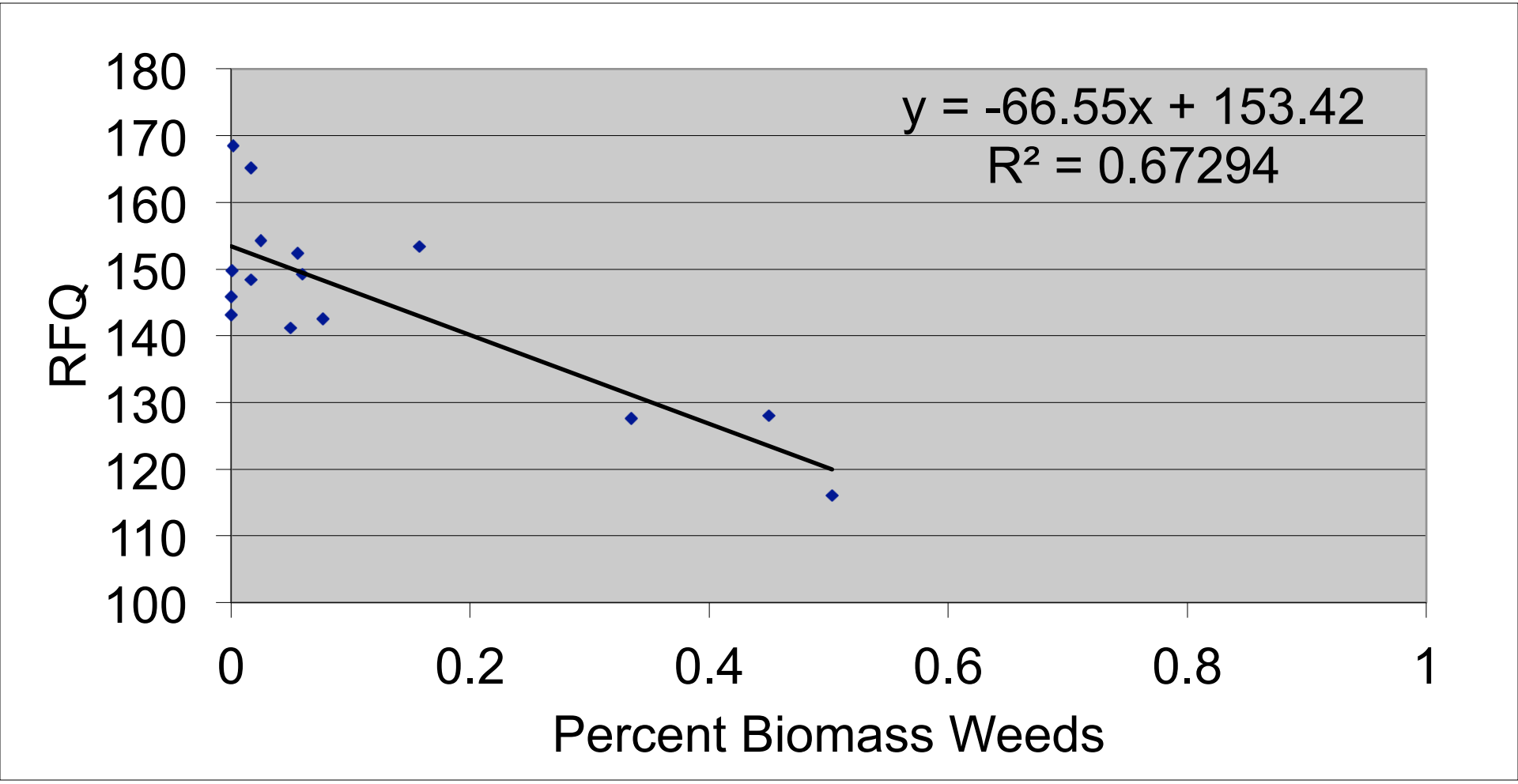
Forage Quality is related to % weeds in forage biomass

Percent weeds in forage biomass

	Dane	Jack	Clark
% Weeds in UTC forage biomass	10 %	45%	65-85%
gly1	1	0	8
gly2	0	4	65
imaz1	0	4	21
imaz2	7	8	63
utc	12	43	83
Prob.	NS	P<0.05	P<0.05

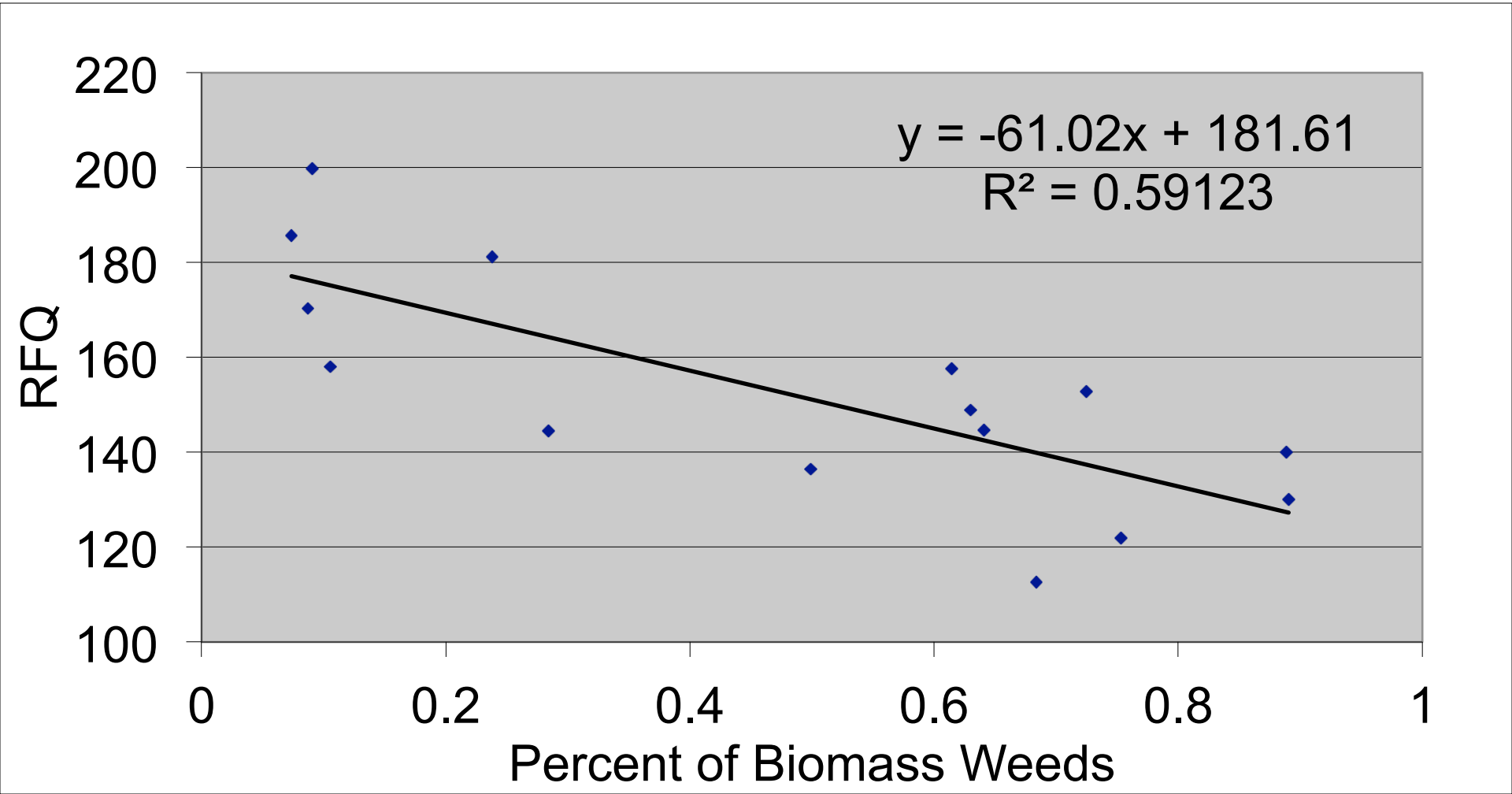
Effect of weed biomass on forage quality

Medium weed populations



Effect of weed biomass on forage quality

High weed populations

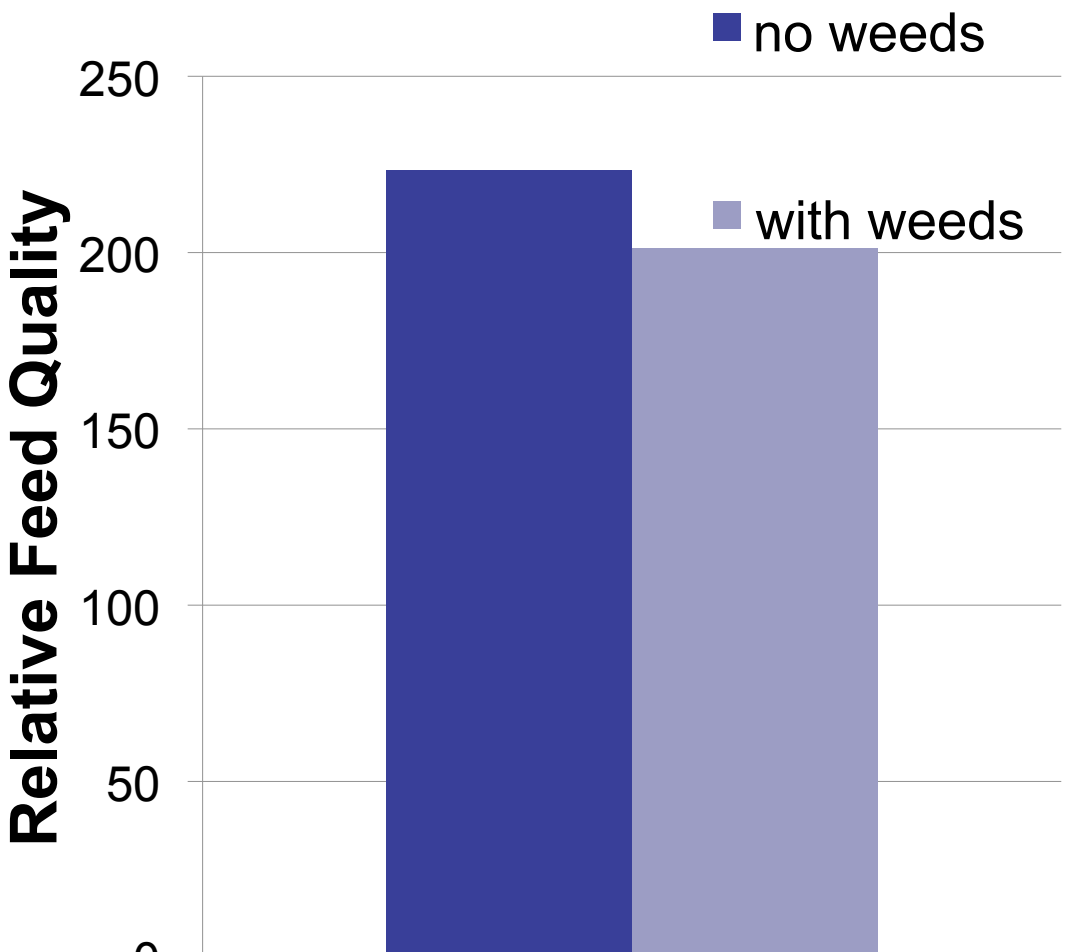


Impact of weeds on RFQ in establishing alfalfa

- Annual broadleaf weeds (lambsquarter,pigweed, ragweed)
  - Reductions in RFQ when percent weed biomass in alfalfa was > 30%
  - In these cases RFQ was reduced 7 RFQ for every 10%
- Annual grasses, mustards, nutsedge
  - Previous work by Doll indicates **greater reductions in RFQ may occur**

Did fall treatments increase RFQ in established alfalfa?

Spring after treatment RFQ



Quackgrass effects on RFQ in established alfalfa

- Studies conducted before RFQ adopted.
- Gordon Harvey Research 70-80s:

  - **In first cut (65% quack)**
    - Reduced crude protein
    - Increased fiber
    - Resulted in 17% less milk compared to pure alfalfa

Do pasture weeds reduce RFQ?

Site	Treatment	RFQ Event 1	RFQ Event 2	RFQ Event 3	RFQ Event 4
Lancaster	UTC	191	142	113	126
	Herb	172	133	115	142
		INCREASE	INCREASE	SAME	DECREASE

Site	Treatment	RFQ Event 1	RFQ Event 2	RFQ Event 3	RFQ Event 4
PDS	UTC	128	128	-	116
	Herb	124	132	-	146
		SAME	SAME		DECREASE

Why does controlling weeds reduce RFQ?

Why differences between pastures?

Impact of weeds on Forage Quality Summary

- Weeds can reduce RFQ
  - Species, stage of development, amount
- Establishing alfalfa
  - When weed populations are moderate to heavy 21-60 point reduction in RFQ
- Established alfalfa
  - Can get reduction in 1st cutting, or when alfalfa doesn't regrow (drought)
- Pastures
  - Reduced only **in the fall** by weeds
    - RFQ can be reduced if eliminate legume + high RFQ weeds

Impact of weeds on alfalfa forage palatability

- Establishing alfalfa
  - Temme et al. (1979): 6% decrease in intake of weedy alfalfa

Impact of weeds on alfalfa forage palatability

- Established alfalfa
  - Quackgrass (Dutt et al. 1979)
    - 45% - 64% quackgrass : 7-14% < intake
  - Perennial broadleaf weeds (Dutt et al. 1982)
    - 15% weed biomass: similar intake
      - Dandelion, yellow rocket, white cockle
    - 20% weed biomass: 8% decrease in intake
      - Yellow rocket
    - 34% weed biomass: similar intake
      - White cockle

Impact of weeds on pasture forage utilization

Location	Lancaster		PDS	
	2012	2013	2012	2013
	% utilization			
UTC (weedy)	61	60	67	55
Herb (weed-free)	79	63	76	61
Prob	<0.01	NS	NS	NS

Impacts are greater in summer to fall

Summary of effect of weeds on forage palability

- Palability can be reduced, depending on weed species and amount

- Alfalfa
  - Weeds can reduce palability and intake, but not to a large degree (0-14%)
- Pastures
  - Utilization can be effected, but only found it 1 out of 6 site years
    - Most severe in summer-fall

Summary

- Weeds can contribute to forage biomass

- Presence can reduce forage quality and intake
  - Dependent on the weed species and amount
  - Reductions only present when they are major part of forage
    - ≥20-30%
  - Reductions can be mitigated

Strategies to minimize impact of weeds on RFQ

- ALFALFA
  - Harvest when RFQ is high in alfalfa
  - Harvest timely before weeds mature
  - Focus control efforts on weedy fields (>30% weeds)
  - Rotate to another crop if stands thin

- PASTURES
  - Use management practices that limit injury to legumes and other plants with high RFQ