

Utilization of Genetic Resources to Match Environmental Conditions

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Increasing Cow Herd Efficiency Dependent Upon

- Changes in environmental conditions
- Magnitude of GxE
 - Mature body size
 - Milk production
 - Fertility
- Access to genetic resources of interest

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Projected Environmental Trend

U.S. Seasonal Drought Outlook
Drought Tendency During the Valid Period
Valid for June 6 - August 31, 2013
Revised June 6, 2013

KEY:

- Red: Drought to persist or intensify
- Orange: Drought ongoing, some improvement
- Green: Drought likely to improve, impacts ease
- Yellow: Drought development likely


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Climate Change Projections

Climate Change	Potential Impact
<ul style="list-style-type: none"> • More extreme weather events; -- Longer more frequent droughts • Changes in vegetation e.g., shift from cool season to warm season grasses • Potential temperature increases 	<ul style="list-style-type: none"> • Nutritional stress • Impact grazing systems & nutrition • May impact fertility

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Current Livestock Industry Issues Are Similar to Climate Change Challenges





- 2012 BIF meeting with emphasis on cow size.
- Continued discussion concerning the optimization of body size, milk production and reproduction

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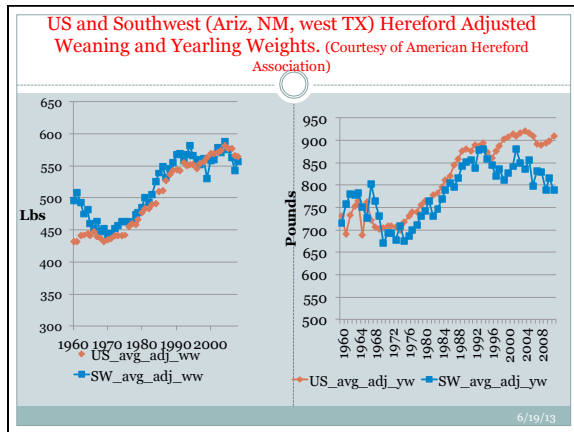
Dixon Water Foundation, Marfa, TX

Issue: Perceived lack of performance of Hereford cows – due to large body size

Proposed solution: Use older genetics that may be better suited to production system

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Examples of Hereford Bulls Used in West Texas

Bull	Wnwt	Yrwt	Mature Cow wt	Breeder location
F 157K Ribstone 753	+57	+101	+121	MT
Churchill Cowboy	+62	+101	+111	MT
K&B 408 Tracer	+52	+92	+82	S. D.
HH Advance 1141Y	+58	+85	+95	MT
BR DM Sooner	+49	+64	+75	TX
2010 Breed Ave	+44	+73	+85	

Dixon's Question – Could bulls stored in the gene bank be used to develop potential solutions?

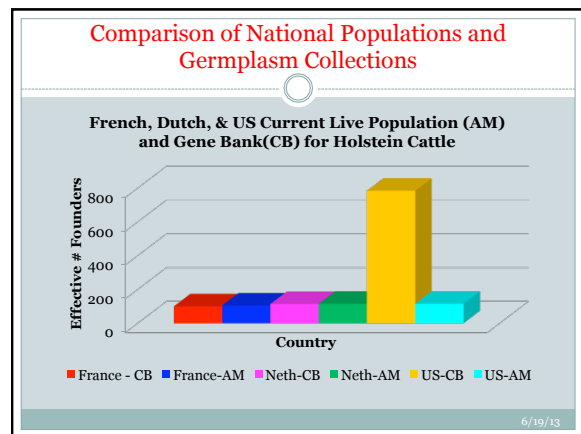
National Animal Germplasm Program - Background

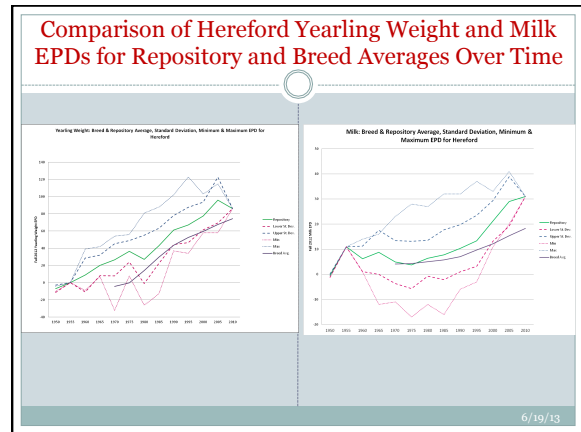
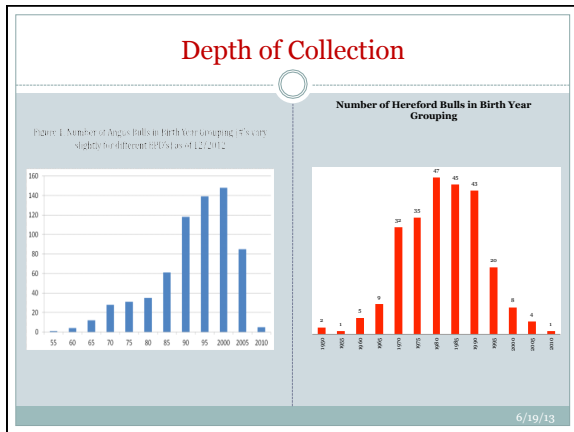
- Initiated in 1999 to address genetic diversity issues:
 - Reduction in genetic variability of important breeds
 - Capture genetic diversity for future use
 - Use during catastrophic events
 - Research



Foot & Mouth outbreaks in 2001 UK and 2010 Japanese & Korea - \$6 billion cost to UK

- ### Collection of Cryopreserved Germplasm
- 35 species
 - 156 breeds
 - 189 lines
 - 21,400 animals
 - 760,636 samples
 - World's largest collection of animal genetic resources
 - 39 breeds (Bos taurus & Bos indicus)
 - Across breeds:
 - 2,749 bulls
 - 175,579 units of semen





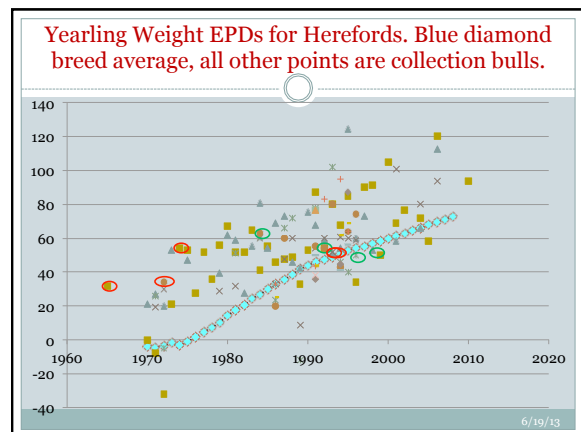
- ### NAGP Hereford Collection
- Current collection
 - 327 bulls and 12,722 units semen
 - Industry based, oldest samples 1948
 - Broad geographic range (Canada + all regions of US)
 - Unique subpopulations
 - Fort Robinson lines (weaning, yearling & index)
 - Inbred lines - Line 1 and Prospector
 - STARS Florida
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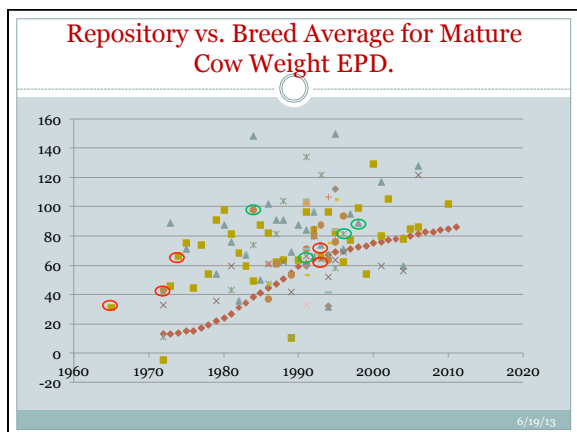
- ### Experimental Plan
- 60 Hereford cows from Sul Ross State University and Dixon Water Foundation
 - Bred to Hereford repository bulls
 - Evaluate
 - Progeny growth
 - Carcass characteristics of grass finished steers
 - Heifer/cow performance over time
 - Grazing behavior & rangeland monitoring
 - 5 year duration
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Targets for Bull Selection

Year	US Yearling Wt	Tx Yearling Wt	Yearling EPD	Mature Cow EPD	Milk EPD
1996	862 lbs	846 lbs	30.6	69.0	10.0
2011	909 lbs	788 lbs	72.6	86.0	17.0

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EPDs for Repository Bulls Selected for Project

Name	Birth Year	Weaning Wt.	Yrlg. Wt.	Milk	Mature Cow Wt.
KIMBOLTON TIBER 13W	1965	20	32	4	31
WCF L1 DOMINO 0150	1990	24	41	1	43
DH L1 DOMINO 222 ET	1982	17	28	15	35
88-115	1988	191 kg actual			
HH HUNTER 492M	2002	45	73	14	104
RF GENETIC PLUS 73C 5L	2001	35	54	10	60

Current Status

- The cows are bred to identified bulls

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Summary

- Results should yield insight if more “moderate” cattle will increase productivity & profitability for extensive rangeland systems in the southwest
- Resulting progeny could serve as a resource for production system adaptability
- The gene bank served as an easy access resource to explore this hypothesis
- Not the first regenerated populations from the gene bank, but certainly the most comprehensive

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