Building Healthier, More Resilient Herds[7]

Project delivers predictable genetic decision–making tools for BRD health and survivability

Bovine respiratory disease (BRD) is the most prevalent illness affecting feedlot cattle in the United States, responsible for approximately 80% of all morbidity (sickness) and 50 to 70% of finishing mortality (death).[1,2]

Healthy cattle not afflicted by BRD tend to have better performance during backgrounding and finishing, as well as more valuable carcass outcomes. While BRD-related traits are generally low in heritability, previous studies have shown that genetic selection is possible, with heritability estimates ranging from 0.01 to 0.26, depending on methodology, breed and trait definition.[3-6]

Project Objectives

The BRD genetic project aimed to develop genomic expected progeny differences (GEPD) for BRD using high density genotypes, available discovered parentage and recorded health events in beef feedlot cattle, specifically defined as:

- **BRD Health (BRDH) GEPD:** Predicted genetic differences in the probability that progeny stay healthy and do not require pull and treatment for BRD.
- **BRD Survival (BRDS) GEPD:** Predicted genetic differences in probability that progeny survive from arrival at backgrounding yards to harvest without dying from BRD.
- **Dollar BRD ($BRD):** Predicted differences in the impact on revenue (direct and indirect) from progeny due to combined genetic merit for BRDH and BRDS.

The $BRD index was developed to help simplify selection and management for combined BRDH and BRDS. The assumed incidences of morbidity (13.5% treated) and mortality (3.8% death) were the same as those in the population described above that was used to develop genetic parameters for BRDH and BRDS GEPD.

Economic assumptions for the $BRD index included the direct cost of BRD treatment ($15 medicine and chute charges) and indirect cost of $60 due to reduced performance and carcass value for treated versus untreated animals in these data. The index assumed that healthy animals had an estimated $75/head advantage as compared with animals treated once or more for BRD. The average estimated cost per mortality of $2,500 was based on the average arrival weight and associated standardized 2025 price/cwt for animals that died, as well as their average days-on-feed and related estimated feed and yardage costs.

Expected Impact

Higher GEPDs for BRDH and BRDS are desirable and indicate greater likelihood of health (not requiring treatment) and survival (not dying).

Using the population of more than 440,000 commercial animals (both female and male) tested using INHERIT®, researchers compared groups of animals ranking in the top versus bottom 25th percentile ranks based on GEPDs for BRDH, BRDS and $BRD (see Table 1 on back). The comparison shows progeny from animals in the top 25th percentiles (ranking 25th or better) are genetically on average:

- **25% more likely to stay healthy and not require treatment for BRD from feedlot arrival to harvest[7]**
- **14% more likely to survive and not die from BRD from feedlot arrival to harvest[7]**
- **$12 per calf advantage in net return from combined genetics for BRD health and survival[7]**

If this same contrast were for bulls tested using INHERIT Connect + BRD Upgrade and they produce an assumed 100 calves during their lifetimes, there's a $1,200 predicted advantage to top versus bottom 25th percentile rank for $BRD.[7]

Table 1. Percent ranks and associated GEPD, and index values for BRDH, BRDS and $BRD for females tested using INHERIT Select as of Dec. 15, 2025 (n = 198,909).

BRD Traits			
	EPD	EPD	
Top % Rank	BRDH	BRDS	$BRD
	%	%	$
1	28	16	$14.77
5	24	14	$12.74
10	22	12	$11.54
20	18	11	$9.92
25	**17**	**10**	**$9.27**
30	15	10	$8.66
40	12	8	$7.51
50	**10**	**7**	**$6.36**
60	7	6	$5.17
70	4	5	$3.84
75	**3**	**4**	**$3.10**
80	1	3	$2.28
90	**-3**	**1**	**$0.23**
95	**-6**	**-1**	**$(1.30)**
99	**-11**	**-3**	**$(3.69)**

Predictive Performance

To verify the efficacy of GEPD for BRDH and BRDS, three different case groups, representing populations of varying breed composition and disease risk were used.

Generally, the genetic predicted and expressed one-third groups for BRD health and survival across the three cases were directionally aligned (Table 2). Cases 1 and 2 that included beef crossbred steers showed clearer alignment of magnitude of predicted and expressed health and survival than Case 3 with beef-dairy crosses that had a low incidence of mortality. These cases underscore favorable relationships between genetic predicted and expressed BRD health and survival, although the magnitude may not be fully expressed due to variation in health management (e.g., vaccination history) and environment (e.g., weather).

Table 2. BRD GEPD efficacy evaluation case groups and observed incidence outcomes.

BRD GEPD Efficacy Evaluation Case Groups									
	Case 1 - Beef Crossbred Steers (n = 500) x 5*			Case 2 - Beef Crossbred Steers (n = 1,000) x 5*			Case 3 - Beef-Dairy Cross Steers (N = 5,232)		
BRDH & BRDS GEPD Groups	Count	Observed Incidence		Count	Observed Incidence		Count	Observed Incidence	
		Healthy	Survival		Healthy	Survival		Healthy	Survival
Top Third	167	97.6%	97.0%	333	87.7%	89.5%	1744	87.7%	99.8%
Middle Third	167	94.6%	96.4%	333	85.9%	88.6%	1744	86.6%	99.7%
Bottom Third	166	68.7%	93.4%	334	81.7%	84.7%	1744	85.1%	99.6%
Difference Top - Bottom		**28.9%**	**3.6%**		**6.0%**	**4.8%**		**2.6%**	**0.2%**

*Random withholding of health events for five different groups and incidences averaged across groups.

Conclusion

Despite relatively low heritability, the models and resultant BRD GEPD can differentiate animals at lower versus higher risk for related health and survival, enabling targeted breeding that effectively manages correlated traits. The inclusion of a $BRD index simplifies selection for respiratory health and survival, and helps quantify related economic differences.

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[1] Blakebrough-Hall C, McMeniman JP, González LA. An evaluation of the economic effects of bovine respiratory disease on animal performance, carcass traits, and economic outcomes in feedlot cattle defined using four BRD diagnosis methods. *J An Sci*. 2020;98(2). https://doi.org/10.1093/jas/skaa005

[2] Brooks KR, Raper KC, Ward CE, Holland BP, Krehbiel CR, Step DL. Economic effects of bovine respiratory disease on feedlot cattle during backgrounding and finishing phases. *The Prof. Anim. Sci.* 2011;27(3):195-203.

[3] Buchanan JW, MacNeil MD, Raymond RC, McClain AR, Van Eenennaam AL. Rapid Communication: Variance component estimates for Charolais-sired fed cattle and relative economic impact of bovine respiratory disease. *J An Sci*. 2016;94(12):5456-5460.

[4] Hayes BJ, Duff CJ, Hine BC, Mahony TJ. Genomic estimated breeding values for bovine respiratory disease resistance in Angus feedlot cattle. *J An Sci*. 2024;102. https://doi.org/10.1093/jas/skae113

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[6] Snowder GD, Van Vleck LD, Cundiff LV, Bennett GL. Bovine respiratory disease in feedlot cattle: environmental, genetic, and economic factors. *J An Sci*. 2006; 84(8):1999-2008.

[7] Zoetis Beef Genetics R&D Technical Report. Development of Genomic Predictions for Bovine Respiratory Disease in Beef Cattle (2024). GG32Z-US-26-030. Project Team Leader, Yeni Bernal. Veterinary Medicine Research & Development Kalamazoo, Michigan 49007 United States.

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