

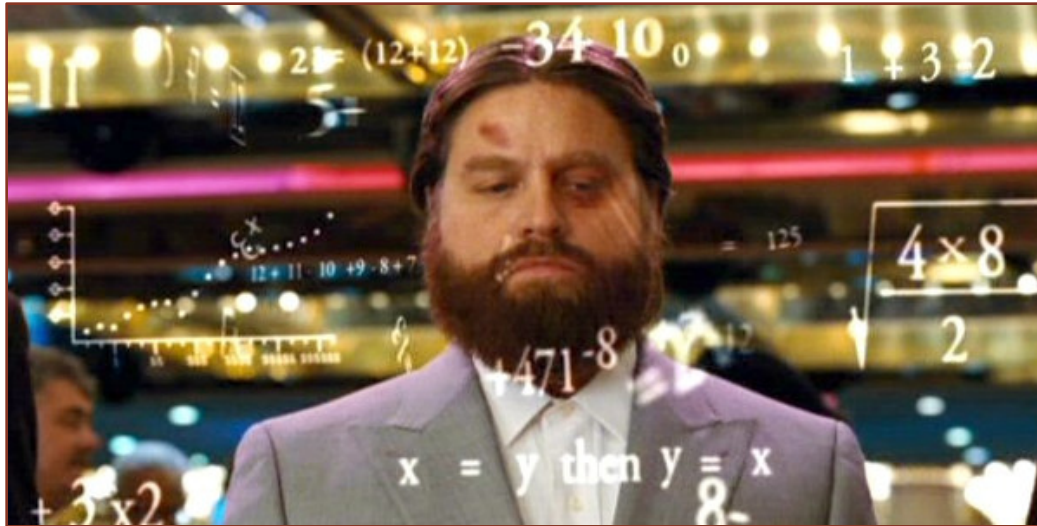
Selection Indexes



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2019 ASA Meeting Breakout Session

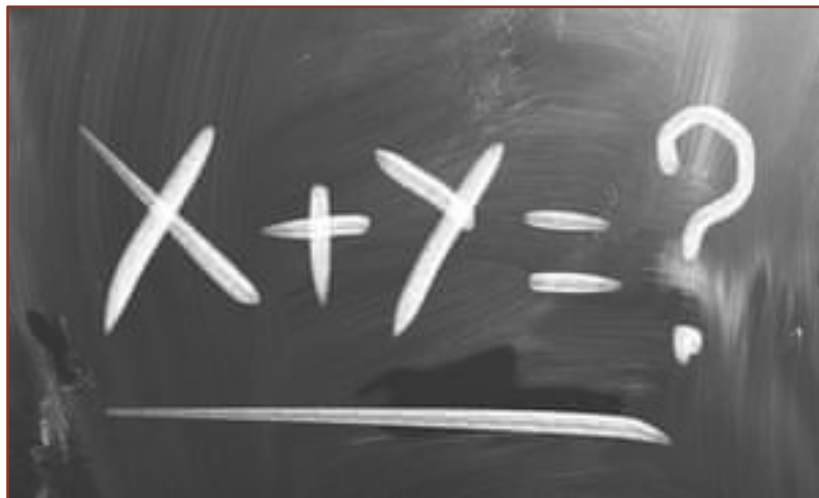
What is a Selection Index?

- **Selection Index Internet definition: “A method of artificial selection in which several useful traits are selected simultaneously”**



Simplify It a Little

- **What's a selection index?**
- **Algebra for cattle breeding!**
- **Using multiple traits in a weighted formula to determine which animal might best fit the breeding objective**



How it Works: The Basics

- **Identify a production scenario**
- **Select traits (EPDs) of importance to scenario**
- **Determine the economic value of traits**
- **Add values together**
- **BOOM! Selection Index**

Production Scenario

- In reality, you can create an index for almost any wild scenario you can dream up
- It's hard to create the perfect scenario that works for everybody
 - Find what's available that fits your herd
- Common basic scenarios
 - Breeding first-calf heifers
 - Mating for feeder cattle
 - Replacement female production

Selection of Traits

- The EPDs available to your breed are what go into building a selection index
 - Can't use something you don't have an EPD for
- Can be as few or as many as you like
- Need to be relevant to the production situation that you're working with



Economic Values

- In real selection index calculation, this is not an arbitrary process
- It's very complicated mathematical work
- Traits can have a positive or negative economic effect...remember that!
- The SAME EPD can be positive or negative, depending on the scenario
 - High YW: small cows (negative impact), big feeder steers (positive impact)

Formula

- If you wrote it out on paper:
 - 4 Traits, listed as an EPD value (T1, T2, T3,T4)
 - All different values of economic importance (A,B,C, D has a negative impact)
- $\text{Index} = (A * T1) + (B * T2) + (C * T3) - (D * T4)$

ASA Selection Indexes

- The 3 ASA Selection Indexes all animals have:
- \$Calving Ease
- \$British Maternal
- \$Feedlot



\$Calving Ease

- **Production scenario: breeding first-calf heifers**
- **Traits (EPDs) involved:**
 - **Calving ease direct (CED)**
 - **Yearling weight (YW), for moderate mature size**

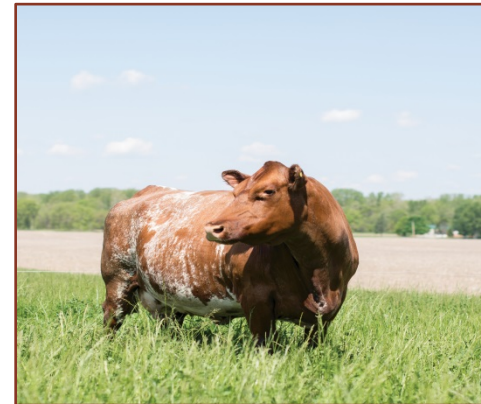
\$British Maternal

- **Production scenario: British-based maternal breeding program**
 - Typical of most commercial cattle operations
- **Traits (EPDs) involved:**
 - Calving Ease Direct (CED)
 - Weaning Weight (WW)
 - Calving Ease Maternal (CEM)
 - Yield Grade (YG)
 - Marbling Score (MB)
 - Milk
 - Yearling Weight (YW)
 - Moderate mature size



\$Feedlot

- **Production scenario: Fed cattle market (retained ownership through the feedlot)**
- **Traits (EPDs) involved:**
 - **Calving Ease Direct (CED) (limit dystocia)**
 - **Weaning Weight (WW)**
 - **Yearling Weight (YW)**
 - **Ribeye Area (REA)**
 - **Marbling Score (MB)**
 - **Fat Thickness (FT)**



Not All Indexes are Created the Same

- Two bulls born the same year
- Similar usage (progeny counts) and EPD accuracies
- \$BMI are nearly identical, but EPD profiles are obviously not!
 - “More than one path to the right answer”

NCE Results		EPDs													Indexes Values			
		Growth and Maternal								Intake and Carcass								
Dated: 10/08/2019		CED	BW	WW	YW	MK	TM	CEM	ST	YG	CW	REA	MB	FT	\$CEZ	\$BMI	\$F	\$Fescue
Subject	EPD	14	-0.7	62	95	27	58	16	20	-0.26	3	0.33	0.46	-0.05	43.84	165.83	64.45	110.83
	+/- Chg	4	0.9	7	8	6		6	5	0.12	8	0.22	0.13	0.02				
Genomics applied	ACC	0.58	0.74	0.69	0.70	0.51		0.36	0.25	0.44	0.62	0.55	0.51	0.44				
% Ranked	% Rank	10	15	15	10	3	2	1	5	90	10	5	1	>95	15	1	1	-
vs Active Sires	Prgy/CGs	36/19	155/59	135/56	75/33	44/18		38/20	10/4		8/4	8/4	8/4	8/4				

NCE Results		EPDs												Indexes Values				
Dated: 10/08/2019		Growth and Maternal								Intake and Carcass					\$CEZ	\$BMI	\$F	\$Fescue
Subject	EPD	CED	BW	WW	YW	MK	TM	CEM	ST	YG	CW	REA	MB	FT				
	+/- Chg	22	-2.6	46	70	22	44	17	12	-0.67	-25	0.40	-0.28	-0.16	73.14	166.10	49.24	
Genomics applied	ACC	0.60	0.77	0.72	0.72	0.57		0.43	0.30	0.12	8	0.22	0.13	0.02				
% Ranked	% Rank	1	5	80	70	20	55	1	55	0.46	0.61	0.56	0.51	0.49				
vs Active Sires	Prgy/CGs	88/54	263/104	216/74	140/46	50/26		53/37	29/14	1	95	3	>95	1	1	1	80	
											22/10	22/10	20/8	21/9				

Lesson From Previous Slide

- **My thought: using JUST an index can get you in just as much trouble as using just one EPD can**
 - **If you didn't know, I'm pretty anti-single trait selection**
- **Those two bulls differ genetically, but have similar \$BMI outcomes, because of math!**
- **Analyze the components of an index that matter most to you, in addition to using indexes for selection**
 - **You and your neighbor may value certain component traits differently**