abacusbio.

Australian Wagyu Association Selection Indexes

Doug Bjelland
John Crowley

BRIDGING SCIENCE & BUSINESS

AuWA/TWA Big Texas Event

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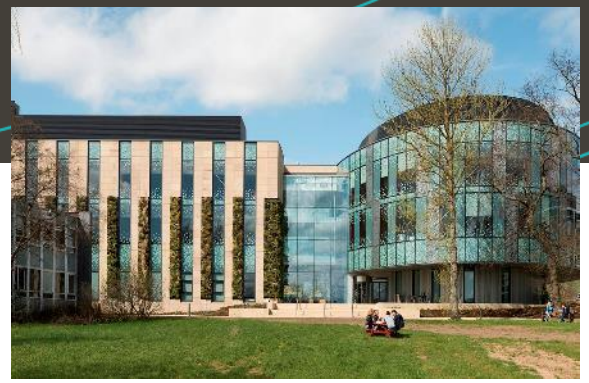
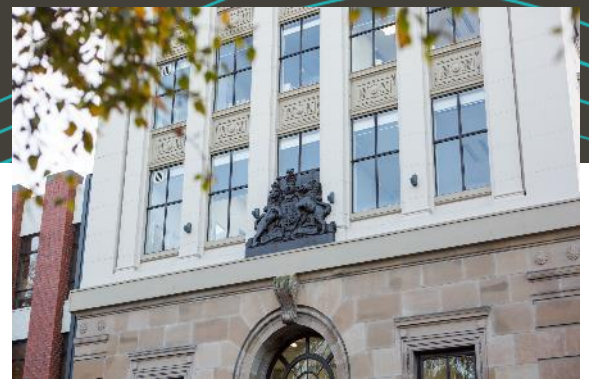
Overview

1. AbacusBio Background
2. Introduction to Selection Indexes
3. Australian Wagyu Association Indexes
4. Summary

Source: Australian Wagyu Association

AbacusBio


- Established 2001
- Independent consultancy providing services and products
- 60 specialists covering
    - Science
    - Strategy
    - Technology
- Livestock, agriculture, horticulture, forestry & aquaculture
- Offices in New Zealand, UK, Canada, and Australia
- Bridge between science outputs and business needs
- **Project team – Sam Harburg, Doug Bjelland, Luke Proctor, & Ee Cheng Ooi**

Some of our clients

Trait prioritisation / Index development

Supply chain analytics

Genetic evaluation

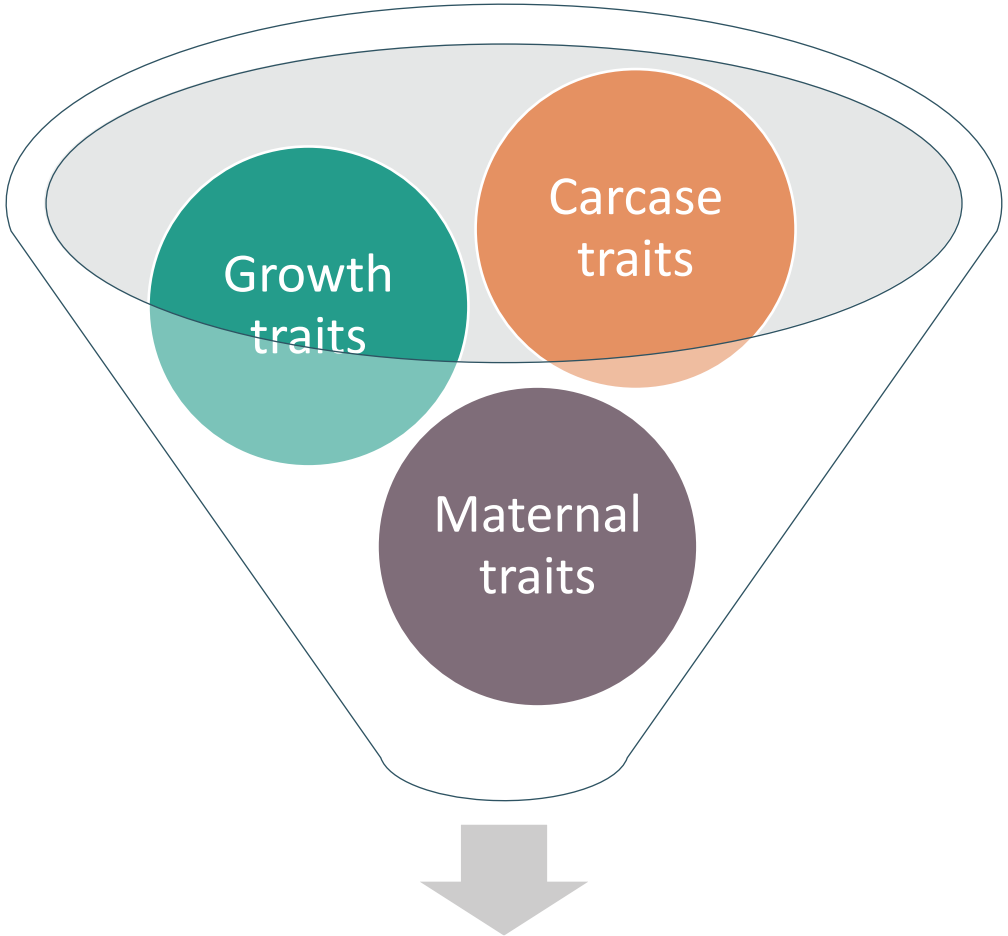
Introduction to Indexes and Methodology

What are Indexes?

- Tools to help simplify selection decisions
  - Summarise genetic merit across traits
  - Compare animals based on expected commercial profit
  - Used to value genetics
  - Also used for modelling/valuing genetic gain

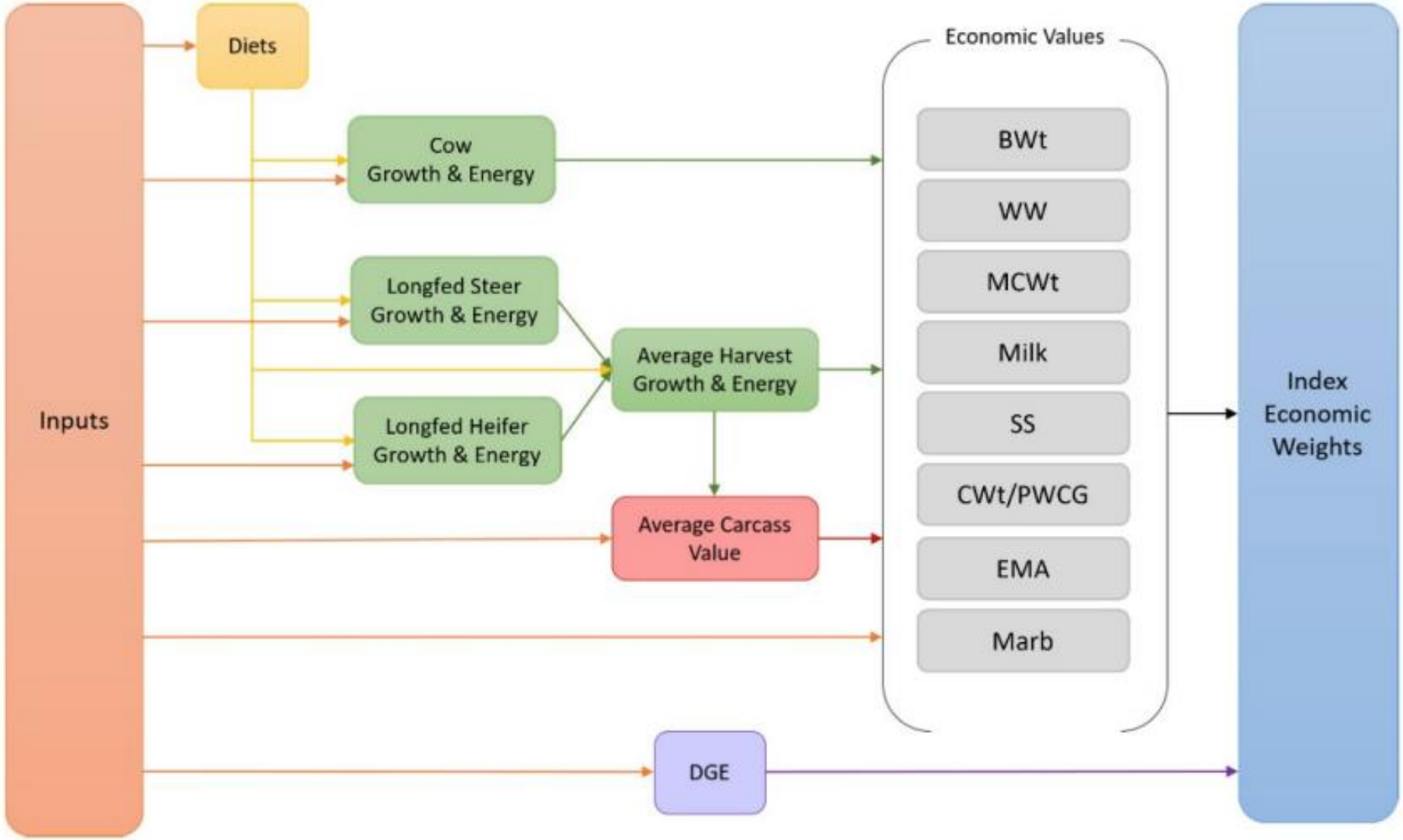
- Index = (EBV 1 x Economic Weight 1) + (EBV 2 x EW2)…..

- **Economic weights based on 1 unit change in target trait while holding all other traits constant**
  - Must incorporate revenue and associated costs (e.g feed costs, labour)



Selection Index

How are they built?



Index Review – Parameter updates

Updates undertaken to index parameters to better reflect contemporary commercial Wagyu performance and supply chain parameters

	FB Terminal	F1 Terminal
Feedlot Entry Wt	Steers – 881 lbs Heifers – 837 lbs	Steers – 925 lbs Heifers – 925 lbs
Days on feedlot	Steers – 450 days Heifers – 450 days	Steers – 350 days Heifers – 350 days
Slaughter Age	Steers – 30mths Heifers – 30mths	Steers – 26mths Heifers – 26mths
Carcase Weight	Steers – 970 lbs Heifers – 925 lbs	Steers – 970 lbs Heifers – 925 lbs

Example Economic Value Calculation

Economic change for a 1-unit change in a trait

Feedlot Steer		**BASE**	**BASE +1 kg slaughter weight**	**Difference**
Birth weight	kg	33.0	33.0	0.0
Live weight at slaughter	kg	759.0	760.0	1.0
Total feed cost of raising to slaughter	$	$2,455.25	$2,458.63	$3.38
Average carcase revenue	$	$5,980.74	$5,988.62	$7.88
Profit per +1 kg change in slaughter live weight	**$**			**$4.50**

AuWA Selection Indexes

Why are there multiple Wagyu Indexes?

Three indexes cover different production systems with different economic drivers. These drivers shape the relative importance of different traits across these systems.

Image sources: AWA & Beefcentral

Breeder-Feeder Index

- Self-replacing fullblood and purebred systems where female progeny are retained
- **Balance between maternal and terminal traits**

Fullblood Terminal Index

- Fullblood system where all progeny are fed for processing
- No emphasis on maternal traits
- **Balance between carcase and growth traits**

F1 Terminal Index

- Crossbred system where all progeny are fed for processing
- Dams contribute growth potential but lower base level of marble score
- **Stronger emphasis on carcase traits**

Index Structure

	BFI	FBT	F1T
Birth Weight	✓	✓	✓
Wean Weight	✓	✓	✓
Milk	✓		
400-day Weight		✓	✓
Mature Cow Weight	✓		
Scrotal Circumference	✓		
Carcase Weight	✓	✓	✓
Marble Score	✓	✓	✓
EMA	✓	✓	✓

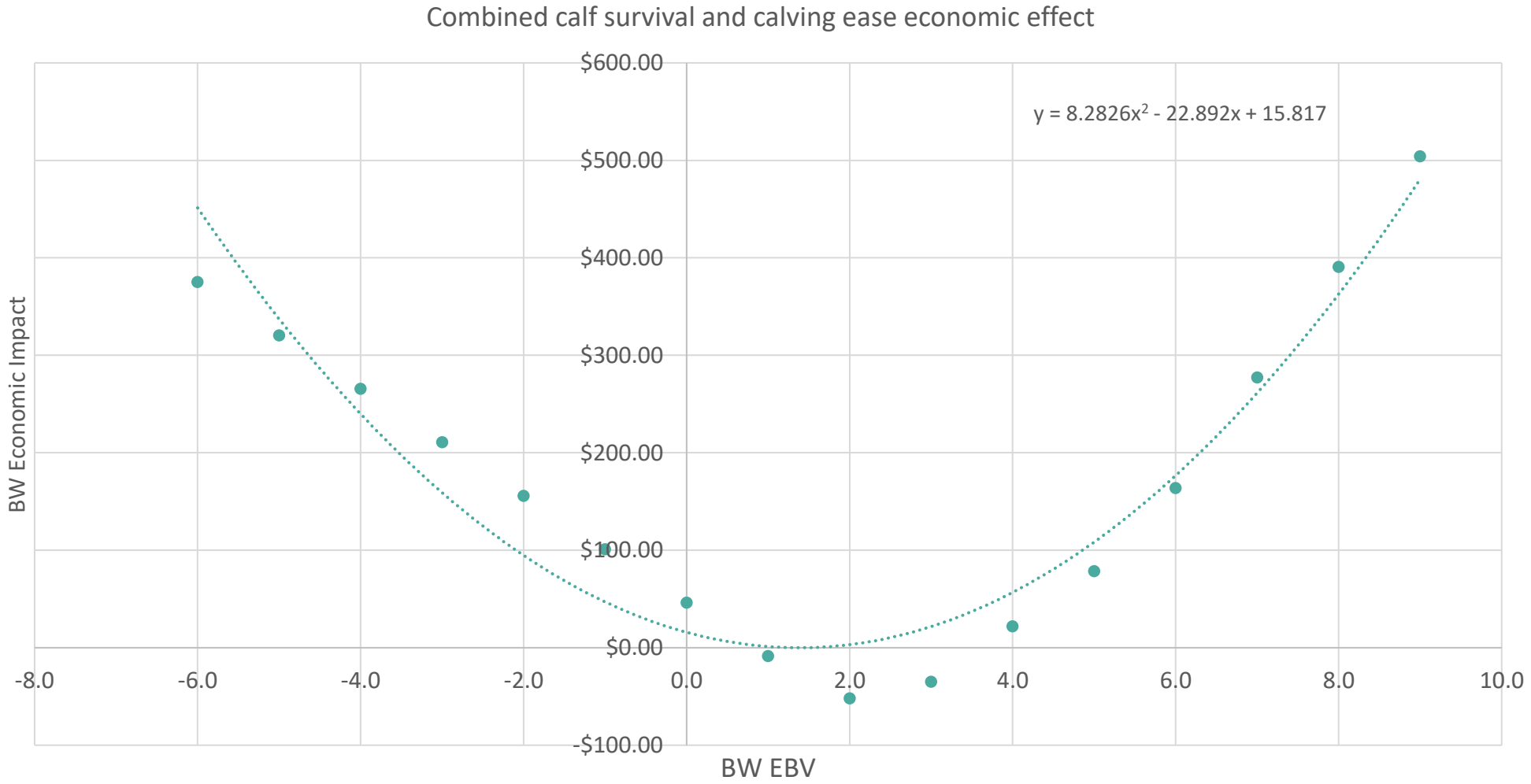
Terminal indexes assume all daughters are finished

- Maternal traits e.g. Milk, MCW not expressed in terminal system

400-day weight not included in original BFI. Prefer to place emphasis on Cwt as main growth trait.

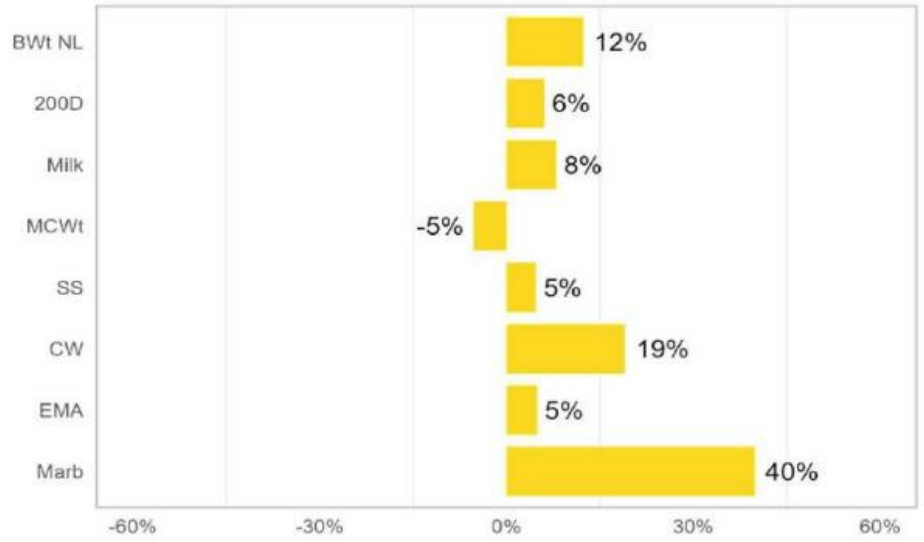
- Member feedback on importance of feedlot entry weight.
- More traits in BFI than terminal indexes
- Cwt has lower correlation with MCW

BFI - Birth weight economic impact per EBV

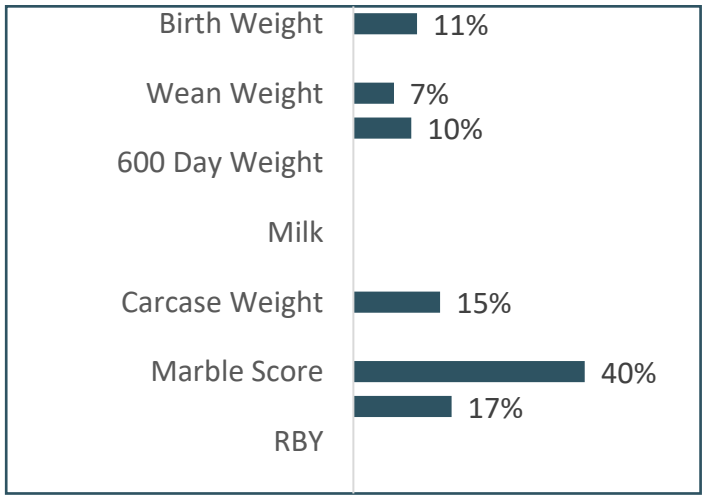


Relative Selection Emphasis

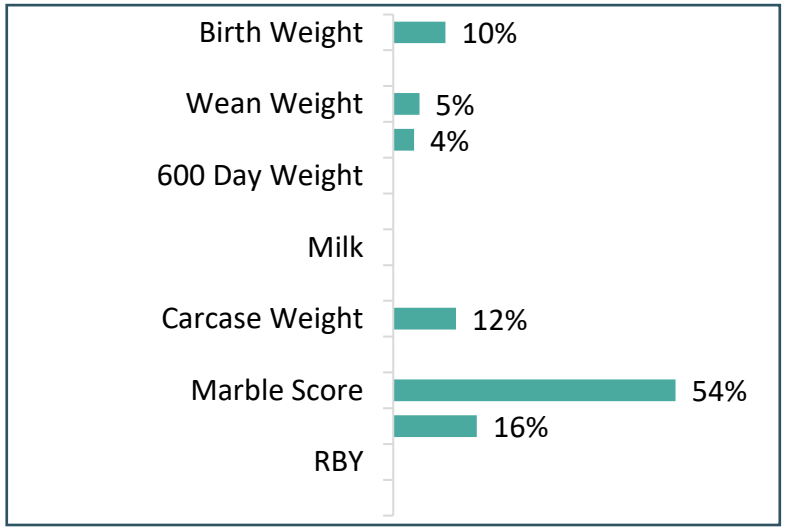
AbacusBio –
Breeder Feeder Index



AbacusBio – Fullblood Terminal Index



AbacusBio – F1 Terminal Index



Standardized Selection Responses

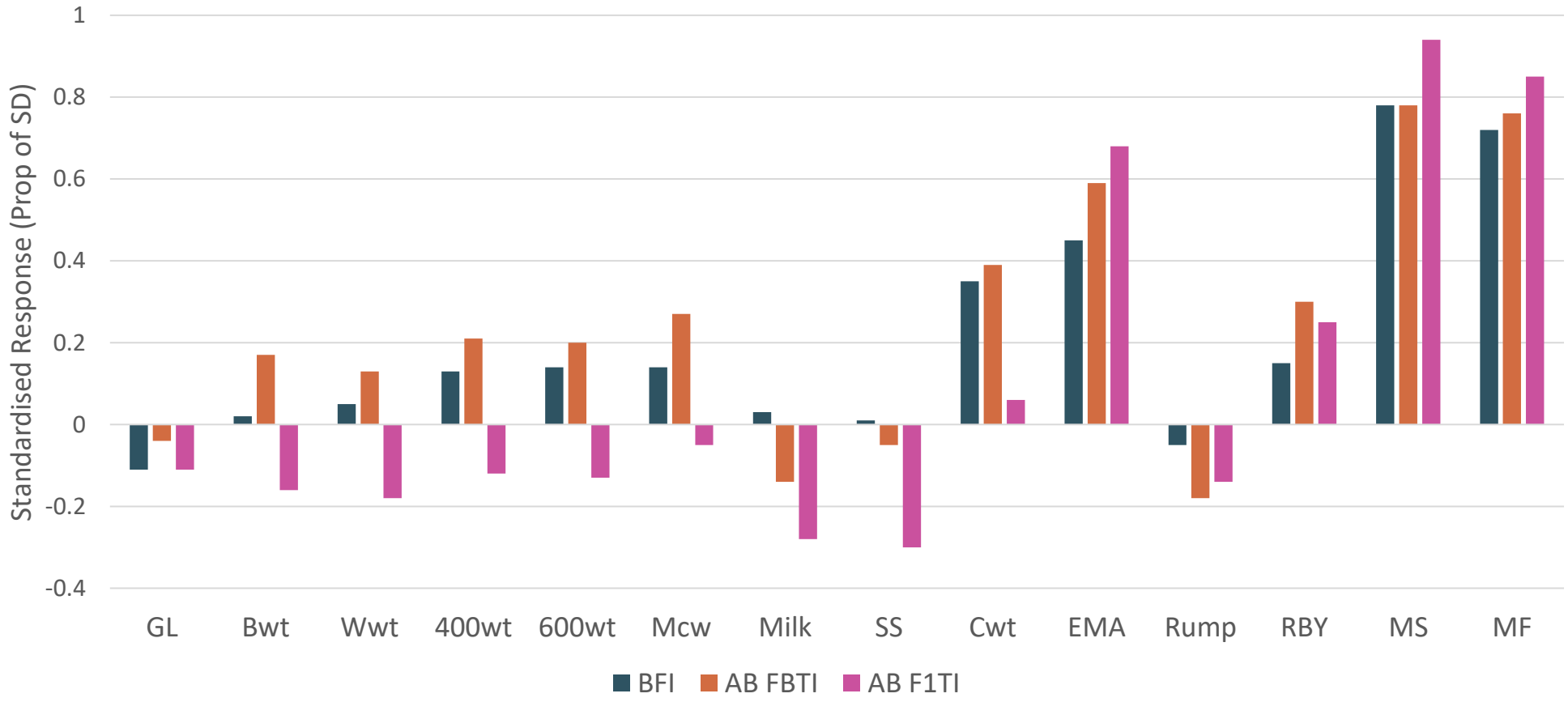
	Units	BFI	AB FBTI	AB F1TI
gl	Prop SD	-0.11	-0.04	-0.11
bw	Prop SD	0.02	0.17	-0.16
ww	Prop SD	0.05	0.13	-0.18
yw	Prop SD	0.13	0.21	-0.12
fw	Prop SD	0.14	0.20	-0.13
mcw	Prop SD	0.14	0.27	-0.05
milk	Prop SD	0.03	-0.14	-0.28
ss	Prop SD	0.01	-0.05	-0.30
cw	Prop SD	0.35	0.39	0.06
ema	Prop SD	0.45	0.59	0.68
rump	Prop SD	-0.05	-0.18	-0.14
rby	Prop SD	0.15	0.30	0.25
ms	Prop SD	0.78	0.78	0.94
mf	Prop SD	0.72	0.76	0.85

More growth for fullblood/purebred indexes

More carcass selection for F1 Index

Low mature cow weight gain and positive selection for milk and ss in BFI

Standardized Selection Responses



Top 25 Bulls – AB F1T

SireID	gl	bw	ww	yw	fw	mcw	milk	ss	cw	ema	rump	rby	ms	mf	AB F1 Index Value	AB F1 Index Rank	BO F1TI	BO F1TI Index Rank
ADBFN0387	3.5	2.2	5	12	20	26	-1	-0.6	24	15.3	-3.1	3.2	3.2	0.41	$426	1	$246	18
IGWFM0352	-3.7	-0.5	7	15	17	23	4	-1.1	40	8.7	-0.8	1.2	3.4	0.62	$417	2	$293	3
ADBFA0139	0.9	0.2	4	8	14	8	-1	-0.6	18	11.3	0.4	1.5	3.3	0.46	$399	3	$261	9
PSKFQ0540	-2.2	-2.6	4	-4	-3	-3	-7	-0.6	19	10.2	1.7	-0.3	3.7	0.67	$398	4	$333	1
ADBFN0268	0.5	1.1	6	12	19	16	1	-0.7	23	11	-0.8	1.1	3.1	0.44	$388	5	$271	4
LSRFQ0102	0.5	1.3	8	12	13	23	-1	-1.6	21	7.1	-0.6	0.3	3.4	0.52	$388	6	$271	4
ADBFD0482	-1.9	0.4	4	0	4	3	0	-1.9	7	18.6	-4.4	3.5	2.8	0.48	$386	7	$265	8
ADBFP1040	3.3	-0.9	-4	2	3	1	1	-0.9	9	5.5	-0.1	0.3	3.6	0.47	$368	8	$252	16
ADBFL0010	-0.1	0.8	13	20	29	18	5	-0.2	28	6.7	-0.5	1.2	3.1	0.34	$366	9	$245	20
CCOFG0113	-0.9	0.9	18	30	40	51	-5	0.2	59	3.6	-3.1	0.5	2.7	0.58	$352	10	$256	12
MYMFP0342	-4.6	5.5	33	60	85	89	-5	-0.1	77	7.6	0.7	0.2	2.5	0.49	$349	11	$307	2
SFWFQ0026	-0.4	-0.5	7	20	30	34	0	-1.7	29	8.5	-1	1.3	2.8	0.4	$345	12	$269	6
HWKFQ0121	-1	0.8	16	14	16	11	-5	-0.6	7	9.6	-4.5	1.9	2.9	0.4	$338	13	$258	11
MYMFR0010	0.8	2.5	9	18	28	46	-7	-1.9	22	10.9	-6.6	3.2	2.6	0.38	$338	14	$194	58
MYMFQ007	-1.1	-4.2	-11	-22	-24	-27	-4	-0.8	-11	16	-0.8	2.5	3.4	0.5	$334	15	$256	12
TBRFQ118	-2.9	-1	13	26	35	39	2	0.7	51	4.2	-0.9	0.4	2.7	0.5	$333	16	$259	10
OGWFQ038	-1.4	1.7	19	35	48	63	0	0.1	58	5.7	1.1	0.4	2.3	0.5	$328	17	$246	18
LFDFD12558	-0.2	2.4	20	23	41	29	3	-0.3	22	5.9	-2.7	1.5	2.8	0.13	$324	18	$216	37
LTCFQ122	0.4	2.9	19	28	31	35	-8	-1.7	36	10.2	-2.8	1.6	2.3	0.43	$322	19	$247	17
MYMFQ0014	-2.1	-0.3	9	16	17	22	-12	0.5	26	8.1	-2.7	1.4	2.6	0.42	$321	20	$240	21
TBRFN185	-2	2.4	17	35	33	31	4	-0.5	29	7.8	-4	2.3	2.4	0.3	$309	21	$240	21
DSWFN4431	1.2	2.3	16	28	37	38	0	-0.6	43	8.9	-1.5	1.8	2.1	0.31	$308	22	$218	33
MIRFP1086	-1.2	3.1	17	30	39	44	4	-0.2	36	9.3	0.7	0.4	2.2	0.42	$306	23	$255	14
GRSFK0483	1.2	3.5	26	46	50	34	3	0.2	52	5.9	1.3	0.5	2.2	0.26	$302	24	$255	14
WKSFP1593	-3.6	-1.9	7	10	14	-1	0	0.2	10	13.7	-3.4	2.6	2.4	0.17	$300	25	$266	7

Top 25 Bulls – AB FBT

SireID	gl	bw	ww	yw	fw	mcw	milk	ss	cw	ema	rump	rby	ms	mf	AB FBT Index Value	AB FBT Index Rank	BO FTI	BO FTI Index Rank
MYMFP0342	-4.6	5.5	33	60	85	89	-5	-0.1	77	7.6	0.7	0.2	2.5	0.49	$476	1	$357	1
ADBFN0387	3.5	2.2	5	12	20	26	-1	-0.6	24	15.3	-3.1	3.2	3.2	0.41	$466	2	$261	18
IGWFM0352	-3.7	-0.5	7	15	17	23	4	-1.1	40	8.7	-0.8	1.2	3.4	0.62	$451	3	$301	3
ADBFA0139	0.9	0.2	4	8	14	8	-1	-0.6	18	11.3	0.4	1.5	3.3	0.46	$424	4	$268	14
ADBFN0268	0.5	1.1	6	12	19	16	1	-0.7	23	11	-0.8	1.1	3.1	0.44	$418	5	$280	6
ADBFD0482	-1.9	0.4	4	0	4	3	0	-1.9	7	18.6	-4.4	3.5	2.8	0.48	$417	6	$269	13
CCOFG0113	-0.9	0.9	18	30	40	51	-5	0.2	59	3.6	-3.1	0.5	2.7	0.58	$414	7	$277	7
LSRFQ0102	0.5	1.3	8	12	13	23	-1	-1.6	21	7.1	-0.6	0.3	3.4	0.52	$404	8	$276	9
OGWFQ038	-1.4	1.7	19	35	48	63	0	0.1	58	5.7	1.1	0.4	2.3	0.5	$395	9	$272	12
ADBFL0010	-0.1	0.8	13	20	29	18	5	-0.2	28	6.7	-0.5	1.2	3.1	0.34	$393	10	$261	18
PSKFQ0540	-2.2	-2.6	4	-4	-3	-3	-7	-0.6	19	10.2	1.7	-0.3	3.7	0.67	$381	11	$326	2
LTCFQ122	0.4	2.9	19	28	31	35	-8	-1.7	36	10.2	-2.8	1.6	2.3	0.43	$376	12	$266	15
GRSFK0483	1.2	3.5	26	46	50	34	3	0.2	52	5.9	1.3	0.5	2.2	0.26	$371	13	$285	4
MYMFR0010	0.8	2.5	9	18	28	46	-7	-1.9	22	10.9	-6.6	3.2	2.6	0.38	$371	14	$214	40
SFWFQ0026	-0.4	-0.5	7	20	30	34	0	-1.7	29	8.5	-1	1.3	2.8	0.4	$368	15	$285	4
MYMFQ0256	-1.2	2.2	27	53	66	63	-2	0.9	70	1.1	-2.8	1	2.1	0.4	$368	16	$266	15
TBRFQ118	-2.9	-1	13	26	35	39	2	0.7	51	4.2	-0.9	0.4	2.7	0.5	$367	17	$276	9
DSWFN4431	1.2	2.3	16	28	37	38	0	-0.6	43	8.9	-1.5	1.8	2.1	0.31	$366	18	$240	30
MIRFP1086	-1.2	3.1	17	30	39	44	4	-0.2	36	9.3	0.7	0.4	2.2	0.42	$360	19	$277	7
ADBFP1040	3.3	-0.9	-4	2	3	1	1	-0.9	9	5.5	-0.1	0.3	3.6	0.47	$348	20	$251	22
HWKFQ0121	-1	0.8	16	14	16	11	-5	-0.6	7	9.6	-4.5	1.9	2.9	0.4	$347	21	$266	15
MYMFQ0014	-2.1	-0.3	9	16	17	22	-12	0.5	26	8.1	-2.7	1.4	2.6	0.42	$346	22	$249	25
LFDFD12558	-0.2	2.4	20	23	41	29	3	-0.3	22	5.9	-2.7	1.5	2.8	0.13	$345	23	$239	31
MYMFP0025	-2.9	1.4	16	32	47	32	3	-0.3	54	6.1	-0.6	0.8	1.8	0.36	$345	24	$242	27
TBRFN185	-2	2.4	17	35	33	31	4	-0.5	29	7.8	-4	2.3	2.4	0.3	$345	25	$261	18

Index Correlations

	sri_index	fti_index	f1ti_index	AB BFI	AB FBT	AB F1T
sri_index	1.00	0.95	0.90	0.77	0.90	0.87
fti_index	0.95	1.00	0.97	0.87	0.93	0.93
f1ti_index	0.90	0.97	1.00	0.83	0.87	0.95
AB BFI	0.77	0.87	0.83	1.00	0.93	0.91
AB FBT	0.90	0.93	0.87	0.93	1.00	0.93
AB F1T	0.87	0.93	0.95	0.91	0.93	1.00

Summary

- BFI and terminal indexes now implemented with consistent methodology
  - Parameters also reviewed/updated to reflect contemporary supply chain performance.

- New indexes generally increase growth response for similar MBS/EMA response.

- New terminal indexes are highly correlated (>0.9) with previous versions.
  - Limited re-ranking – 22/25 (F1TI) and 21/25 (FBTI) bulls remain in Top 25 bulls across versions.

- Users need to be aware of changes to Birth Weight across the terminal index and consider how this reflects their system.

Questions?

Doug Bjelland – dbjelland@abacusbio.com

John Crowley – jcrowley@abacusbio.com

Sam Harburg - sharburg@abacusbio.com

Thank you

EBV Correlations

	GL	BWt	200D	400D	600D	MCWt	Milk	SS	CW	EMA	Rump	RBY%	MS	MF	SRI	PWCG
GL		0.29	0.03	0.00	0.00	0.12	-0.06	0.05	0.00	-0.03	0.19	-0.20	-0.02	0.11	-0.05	-0.01
BWt	0.29		0.84	0.84	0.83	0.83	0.34	0.53	0.68	-0.28	-0.20	0.12	-0.27	-0.12	0.12	0.56
200D	0.03	0.84		0.96	0.93	0.84	0.43	0.71	0.79	-0.33	-0.15	0.21	-0.32	-0.24	0.17	0.65
400D	0.00	0.84	0.96		0.97	0.89	0.43	0.72	0.86	-0.35	-0.14	0.19	-0.29	-0.22	0.21	0.75
600D	0.00	0.83	0.93	0.97		0.91	0.47	0.72	0.88	-0.34	-0.13	0.17	-0.30	-0.24	0.17	0.79
MCWt	0.12	0.83	0.84	0.89	0.91		0.37	0.62	0.82	-0.29	-0.13	0.15	-0.24	-0.10	0.23	0.74
Milk	-0.06	0.34	0.43	0.43	0.47	0.37		0.52	0.44	-0.41	0.12	-0.12	-0.41	-0.34	-0.35	0.40
SS	0.05	0.53	0.71	0.72	0.72	0.62	0.52		0.68	-0.44	0.18	-0.07	-0.43	-0.39	-0.18	0.61
CW	0.00	0.68	0.79	0.86	0.88	0.82	0.44	0.68		-0.21	0.02	0.10	-0.13	-0.02	0.27	0.98
EMA	-0.03	-0.28	-0.33	-0.35	-0.34	-0.29	-0.41	-0.44	-0.21		-0.16	0.54	0.57	0.53	0.63	-0.15
Rump	0.19	-0.20	-0.15	-0.14	-0.13	-0.13	0.12	0.18	0.02	-0.16		-0.73	-0.07	-0.01	-0.14	0.08
RBY%	-0.20	0.12	0.21	0.19	0.17	0.15	-0.12	-0.07	0.10	0.54	-0.73		0.04	-0.02	0.33	0.06
MS	-0.02	-0.27	-0.32	-0.29	-0.30	-0.24	-0.41	-0.43	-0.13	0.57	-0.07	0.04		0.87	0.77	-0.06
MF	0.11	-0.12	-0.24	-0.22	-0.24	-0.10	-0.34	-0.39	-0.02	0.53	-0.01	-0.02	0.87		0.72	0.05
SRI	-0.05	0.12	0.17	0.21	0.17	0.23	-0.35	-0.18	0.27	0.63	-0.14	0.33	0.77	0.72		0.28
PWCG	-0.01	0.56	0.65	0.75	0.79	0.74	0.40	0.61	0.98	-0.15	0.08	0.06	-0.06	0.05	0.28	

EBV Percentiles

Percentile Band	Gestation Length (days)	Birth Wt (kg)	200 Day Wt (kg)	400 Day Wt (kg)	600 Day Wt (kg)	Mat Cow Wt (kg)	Milk (kg)	Scrotal Size (cm)	Carcase Wt (kg)	Eye Muscle Area (sq cm)	Rump Fat (mm)	Retail Beef Yield (%)	Marble Score	Marble Fineness (%)	Self Replacing Index ($)	Fullblood Terminal Index ($)	F1 Terminal Index ($)	Breeder Feeder Index ($)
Top Value	-5.7	-6.7	+52	+88	+126	+140	+13	+4.6	+117	+18.4	+8.9	+3.7	+4.8	+0.76	+457	+379	+365	+713
Top 1%	-3.4	-3.1	+35	+58	+77	+84	+8	+2.3	+69	+11.8	+5.0	+2.4	+3.2	+0.52	+338	+289	+271	+462
Top 5%	-2.4	-1.9	+28	+46	+61	+65	+6	+1.4	+53	+9.0	+3.5	+1.8	+2.6	+0.43	+286	+246	+231	+380
Top 10%	-1.8	-1.2	+23	+39	+53	+56	+5	+1.0	+46	+7.6	+2.7	+1.4	+2.3	+0.38	+259	+223	+209	+338
Top 15%	-1.5	-0.7	+21	+35	+47	+49	+4	+0.8	+40	+6.6	+2.2	+1.2	+2.1	+0.35	+242	+208	+194	+308
Top 20%	-1.2	-0.3	+19	+31	+42	+45	+3	+0.6	+36	+5.9	+1.8	+1.0	+1.9	+0.32	+228	+196	+182	+285
Top 25%	-1.0	+0.0	+17	+28	+39	+41	+3	+0.4	+33	+5.3	+1.4	+0.9	+1.8	+0.30	+216	+186	+172	+265
Top 30%	-0.8	+0.3	+15	+26	+35	+37	+2	+0.3	+30	+4.7	+1.0	+0.7	+1.7	+0.28	+206	+177	+164	+247
Top 35%	-0.6	+0.5	+14	+23	+32	+34	+2	+0.1	+27	+4.2	+0.7	+0.6	+1.6	+0.26	+196	+169	+156	+230
Top 40%	-0.5	+0.8	+13	+21	+29	+31	+1	+0.0	+24	+3.7	+0.4	+0.5	+1.4	+0.24	+188	+161	+148	+214
Top 45%	-0.3	+1.0	+11	+19	+27	+28	+1	-0.1	+22	+3.3	+0.2	+0.4	+1.3	+0.22	+180	+154	+141	+198
Top 50%	-0.1	+1.3	+10	+17	+24	+25	+1	-0.2	+20	+2.8	-0.1	+0.2	+1.2	+0.21	+172	+147	+134	+183
Top 55%	+0.0	+1.5	+9	+15	+22	+22	+0	-0.3	+17	+2.4	-0.4	+0.1	+1.1	+0.19	+164	+140	+127	+168
Top 60%	+0.2	+1.7	+8	+14	+19	+19	+0	-0.4	+15	+1.9	-0.7	+0.0	+1.0	+0.17	+156	+133	+120	+152
Top 65%	+0.3	+2.0	+7	+12	+16	+16	-1	-0.5	+12	+1.5	-1.0	-0.1	+0.9	+0.16	+148	+126	+113	+136
Top 70%	+0.5	+2.3	+6	+10	+14	+12	-1	-0.7	+10	+1.0	-1.3	-0.2	+0.8	+0.14	+139	+118	+105	+119
Top 75%	+0.7	+2.5	+4	+7	+11	+9	-2	-0.8	+7	+0.4	-1.6	-0.4	+0.6	+0.12	+129	+110	+97	+101
Top 80%	+0.9	+2.9	+3	+5	+7	+5	-2	-0.9	+4	-0.2	-2.0	-0.5	+0.5	+0.10	+119	+101	+87	+80
Top 85%	+1.2	+3.3	+1	+2	+3	+1	-3	-1.1	+0	-0.9	-2.4	-0.7	+0.3	+0.07	+107	+90	+77	+57
Top 90%	+1.5	+3.7	-1	-2	-2	-5	-4	-1.3	-4	-1.8	-3.0	-0.9	+0.1	+0.04	+93	+77	+64	+28
Top 95%	+1.9	+4.5	-4	-7	-9	-14	-5	-1.6	-12	-3.0	-3.8	-1.2	-0.2	-0.01	+70	+57	+44	-14
Top 99%	+2.9	+6.0	-11	-17	-24	-30	-7	-2.1	-24	-5.6	-5.4	-1.8	-0.8	-0.10	+28	+18	+6	-101
Low Value	+5.7	+9.9	-26	-42	-61	-75	-13	-3.7	-51	-11.7	-9.1	-3.7	-2.6	-0.42	-80	-75	-89	-327