

## 1 Supplementary Table S1. Formulation and composition of the experimental diets.

Ingredient	Control Wheat g	<i>SBEIIa/b</i> -AB Wheat g	Inulin g	Cellulose g
Casein	64	50	150	150
L-Cystine	3	3	3	3
Control Wheat	560	0	0	0
<i>SBEIIa/b</i> -AB Wheat	0	560	0	0
Corn Starch†	0	36	328	365
Maltodextrin 10	110	110	110	110
Dextrose	93	93	150	150
Cellulose, BW200	0	0	0	100
Inulin, Orafti HP	0	0	100	0
Soybean Oil	64	64	75	75
Mineral Mix S10026B‡	50	50	50	50
Vitamin Mix V10001§	10	10	10	10
Choline Bitartrate	2	2	2	2
Total	956	978	978	1015
Composition				
Protein	134.9	134.9	135.0	135.0
Carbohydrate	635.2	634.8	635.0	635.0
Fat	75.2	75.2	75.1	75.0

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3 † MELOJEL® Corn Starch (Ingredient, Linden, NJ).

4 ‡ Mineral Mix S10026B (Research Diets Inc., New Brunswick, NJ), contained, per kg of mix, 260 g of Calcium Phosphate, 110 g of  
5 Calcium Carbonate, 330 g of Potassium Citrate Monohydrate, 51.8 g of Sodium Chloride, 8.38 g of Magnesium Oxide, 51.52 g of  
6 Magnesium Sulfate Heptahydrate, 0.06 g of Ammonium Molybdate Tetrahydrate, 0.385 g of Chromium Potassium Sulfate, 0.21 g of  
7 Copper Carbonate, 4.2 g of Ferric Citrate, 2.45 g of Manganous Carbonate, 0.007 g of Potassium Iodate, 0.04 g of Sodium Fluoride,  
8 0.007 g of Sodium Selenite, 1.12 g of Zinc Carbonate, and 179.821 g of Sucrose.

9 § Vitamin Mix V10001 (Research Diets Inc., New Brunswick, NJ), contained, per kg of mix, 0.8 g of Vitamin A Acetate (500,000  
10 IU/gm), 1 g of Vitamin D3 (100,000 IU/gm), 10 g of Vitamin E Acetate (500 IU/gm), 0.08 g of Menadione Sodium Bisulfite, (62.5%  
11 Menadione), 2 g of Biotin (1.0%), 1 g of Cyanocobalamin (0.1%), 0.2 g of Folic Acid, 3 g of Nicotinic Acid, 1.6 g of Calcium  
12 Pantothenate, 0.7 g of Pyridoxine-HCl, 0.6 g of Riboflavin, 0.6 g of Thiamin HCl, and 978.42 g of Sucrose.

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1 Supplementary Table S2. Retention time and quantifier ions of short chain fatty acid DMTBS-esters.

Analyte	t <sub>r</sub> (min)	Quant Ion (m/z)	Qual Ion	
d3-acetate	1.950	120.1	162.1	2
acetate	1.954	117.1	159.1	3
d3-propionate	2.211	134.1	173.1	4
propionate	2.218	131.1	186.1	5
d3-butyrate	2.465	148.1	190.1	6
butyrate	2.475	145.1	187.1	7
15:1n5 me	5.670	221.1	180.1	8
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For Review Only

1 Supplementary Table S3. Spike density, spikelet number and kernel number for *SBEIIa/b*-AB mutants and wild-  
 2 type sib control lines and fixed model ANOVAs for combined locations. Untransformed arithmetic means are  
 3 reported for the three locations combined and separately.

<i>SBEIIa/b</i> -AB	Spike Density spikes m <sup>-2</sup>	Spikelet Number spikelets spike <sup>-1</sup>	Kernel Number kernels spike <sup>-1</sup>
All Locations	514.3 ± 37.0	17.9 ± 0.3	32.5 ± 2.8
Imperial Valley	520.3 ± 43.3	17.8 ± 0.5	40.9 ± 4.8
Sacramento Valley	627.9 ± 65.0	17.4 ± 0.2	19.7 ± 1.3
San Joaquin Valley	394.7 ± 49.1	18.5 ± 0.5	36.9 ± 2.5
<b>Control</b>			
All Locations	534.6 ± 25.4	17.6 ± 0.2	30.7 ± 2.5
Imperial Valley	516.7 ± 16.7	17.0 ± 0.4	33.5 ± 1.5
Sacramento Valley	640.5 ± 35.8	17.7 ± 0.4	17.8 ± 2.3
San Joaquin Valley	446.7 ± 34.5	18.0 ± 0.2	40.8 ± 0.8
<b>Source of Variation</b>			
Genotype† ( <i>P</i> )	0.5	0.3	0.3
Location‡ ( <i>P</i> )	0.0015	0.2	< 0.0001
Genotype*Location† ( <i>P</i> )	0.8	0.2	0.048
Block(Location)† ( <i>P</i> )	0.2	0.1	0.09
Variation Explained ( <i>R</i> <sup>2</sup> )	0.78	0.73	0.91

4 † Error used = MS(Error)

5 ‡ Error used = MS(block(location))

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1 Supplementary Table S4. RVA parameters for *SBEIIa/b-AB* mutants and wild-type sib control lines and fixed model ANOVAs for combined  
 2 locations. Untransformed arithmetic means are reported for three locations combined and separately.

<i>SBEIIa/b-AB</i>	Peak RVU	Trough RVU	Breakdown RVU	Final Viscosity RVU	Setback RVU	Peak Time minutes	Pasting Temperature °C
All Locations	83.8 ± 2.3	77.7 ± 2.6	6.1 ± 0.4	155.7 ± 4.6	78.0 ± 2.2	7.0 ± 0.01	76.5 ± 3.0
Imperial Valley	92.2 ± 2.4	87.4 ± 2.8	4.8 ± 0.6	174.5 ± 5.3	87.1 ± 2.6	7.0 ± 0.02	78.7 ± 4.8
Sacramento Valley	73.8 ± 2.4	66.8 ± 2.7	6.9 ± 0.5	136.2 ± 2.9	69.4 ± 1.4	7.0 ± 0.02	79.9 ± 4.5
San Joaquin Valley	85.3 ± 2.9	78.9 ± 3.3	6.5 ± 0.8	156.3 ± 5.4	77.4 ± 3.1	7.0 ± 0.03	70.9 ± 6.3
<b>Control</b>							
All Locations	167.4 ± 4.1	126.8 ± 3.2	40.6 ± 2.4	238.0 ± 5.3	111.2 ± 2.6	5.8 ± 0.04	68.8 ± 2.5
Imperial Valley	172.1 ± 4.6	120.7 ± 3.0	51.4 ± 3.6	238.4 ± 5.4	117.7 ± 3.0	5.8 ± 0.05	62.8 ± 2.5
Sacramento Valley	147.2 ± 2.0	115.8 ± 1.7	31.4 ± 0.8	213.2 ± 2.6	97.4 ± 1.3	5.9 ± 0.02	70.7 ± 4.8
San Joaquin Valley	182.8 ± 3.6	143.9 ± 1.7	38.9 ± 2.3	262.4 ± 2.5	118.5 ± 1.3	6.0 ± 0.03	72.9 ± 4.6
<b>Source of Variation</b>							
Genotype† ( <i>P</i> )	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	0.056
Location‡ ( <i>P</i> )	< 0.0001	< 0.0001	0.8	< 0.0001	< 0.0001	0.2	0.6
Genotype*Location† ( <i>P</i> )	0.07	< 0.0001	0.0002	0.0016	0.06	0.0032	0.2
Block(Location)† ( <i>P</i> )	0.6	0.6	0.2	0.9	0.95	0.1	0.4
Variation Explained ( <i>R</i> <sup>2</sup> )	0.99	0.98	0.98	0.97	0.95	0.99	0.64

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 4 RVU = Rapid Visco Units

5 † Error used = MS(Error)

6 ‡ Error used = MS(block(location))

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- 1 Supplementary Table S5. Fermentation response indices in rats fed Inulin and Cellulose diets. Untransformed  
 2 arithmetic means are reported.

Cecal Contents	Inulin	Cellulose
Weight (g)	3.88 ± 0.39	1.70 ± 0.19
pH	5.98 ± 0.10	7.66 ± 0.04
SCFAs (μmol)		
Total†	668.0 ± 84.9	113.2 ± 11.5
Acetate	296.3 ± 42.7	65.4 ± 9.0
Propionate	131.2 ± 29.7	8.3 ± 1.4
Butyrate	98.9 ± 24.7	8.6 ± 1.2
Serum Gut Peptides		
GLP-1 (pmol/L)	0.21 ± 0.06	0.26 ± 0.06
PYY (ng/mL)	0.70 ± 0.08	0.76 ± 0.07

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 4 † Total SCFAs include acetate, propionate and butyrate.  
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