SUPPLEMENTARY DATA

SUPPLEMENTARY TABLES

Table S1. Exclusion criteria of the study.

Exclusion criteria
– Participants meeting all five criteria for metabolic syndrome (MetS);
– Diagnosis of heart, liver, or kidney failure (other organ diseases were assessed case-by-case by the study doctor);
– Regular drug therapy with impact on serum lipids (e.g., statins, fibrates);
– Diabetes (fasting glucose >126 mg/dL, or anti-diabetic treatment);
– Overt hypothyroidism (subjects with ongoing thyroxine treatment and normal TSH levels could be included);
– Familial dyslipidaemia;
– Recent history of cancer or cancer treatment (less than two years);
– Active or recently diagnosed intestinal malabsorption or disorders associated with malabsorption: Crohn's disease, short bowel syndrome, pancreatic insufficiency, cystic fibrosis, Tropical Sprue, Whipple's disease, chronic pancreatitis, gastrojejunostomy, surgical treatments for obesity, cholestasis, biliary atresia, parasite infections, HIV/AIDS;
– Use of medication known to cause malabsorption: tetracycline, cholestyramine, aluminium/magnesium hydroxide, colchicine, neomycin, methotrexate, methyldopa, allopurinol, and laxatives;
– Antibiotic treatment within the last month;
– Illegal drug use, chronic alcoholism;
– Smoking ≥5 cigarettes per day;
– Intensive physical exercise (≥5 hours per week);
– History of allergy or intolerance to any components used in bioactive-enriched foods (BEF), celiac disease, lactose intolerance, allergy to milk or egg proteins;
– Consumption of nutritional supplements containing docosahexaenoic acid (DHA), β-glucans (BG), or anthocyanins (AC);
– Women who are pregnant, lactating or actively trying to conceive;
– Institutionalised patients, those who lack the autonomy to consent or are unable to meet all examinations;
– Participation in other clinical trials that may impact on outcome;
– Subjects deprived of their liberty by judicial or administrative decision.

Table S2. Cut-off target ranges of the clinical and metabolic parameters.

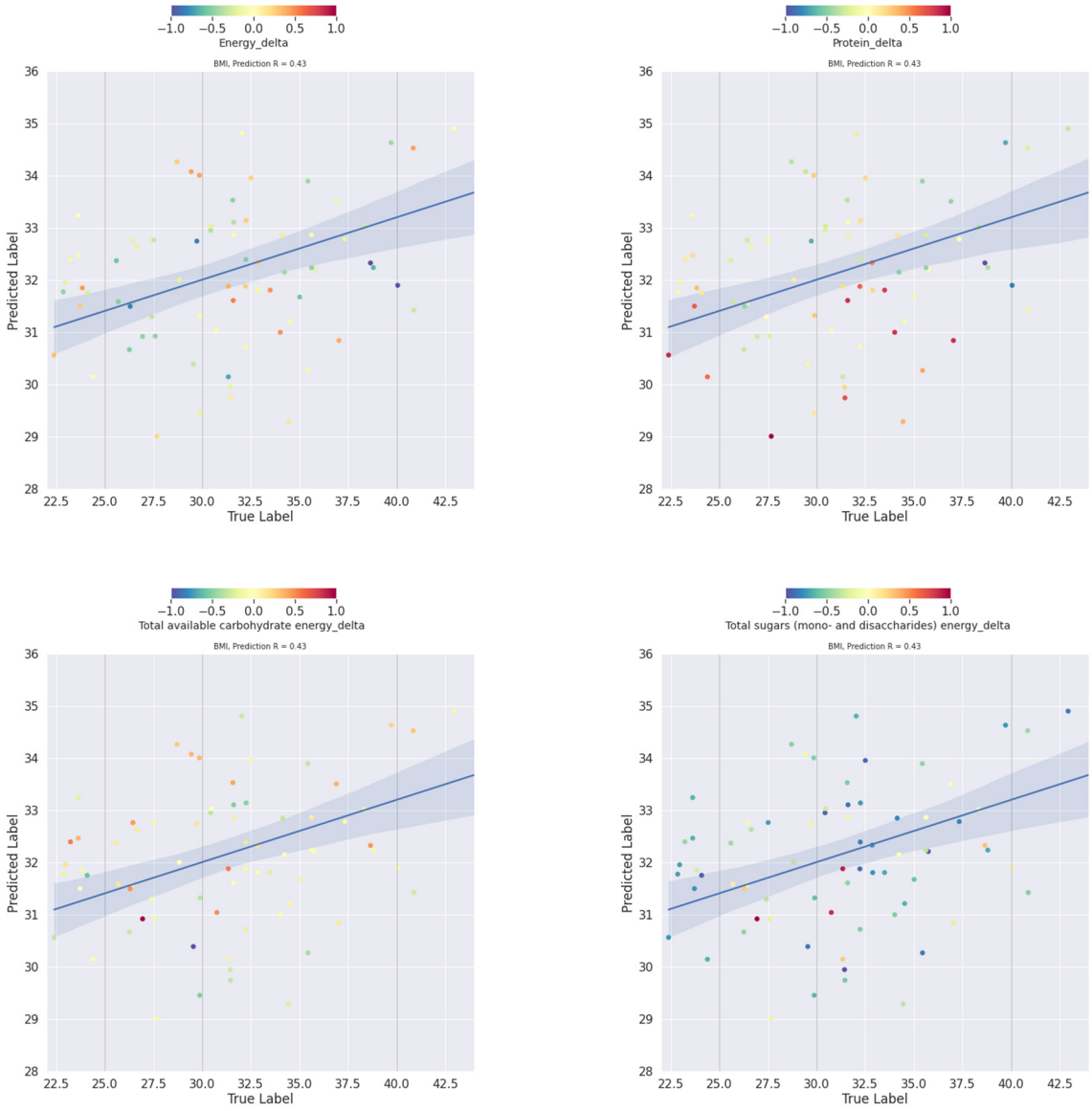
Clinical and metabolic parameters		Cut-off target ranges	Reference
Anthropometric characteristics	**Body mass index (BMI)**		[1]
	Normal	18.5–24.9 kg/m^2	
	High	≥25 kg/m^2	
	Waist circumference (WC)		[2]
	Normal	<88 cm for women, <102 cm for men	
	High	≥88 cm for women, ≥102 cm for men	
Lipid profile	**Triglycerides (TG)**		[2]
	Normal	<150 mg/dL	
	High	≥150 mg/dL	
	Total cholesterol		[2]
	Normal	<200 mg/dL	
	High	≥200 mg/dL	
	LDL cholesterol (LDL-C)		[2]
	Normal	<160 mg/dL	
	High	≥160 mg/dL	
	HDL cholesterol (HDL-C)		[2]
	Normal	women >50 mg/dL, men >40 mg/dL	
	Low	women ≤50 mg/dL, men ≤40 mg/dL	
Glucose profile	**Fasting glucose**		[3]
	Normal	<100 mg/dL	
	High	≥100 mg/dL	
	Fasting insulin		[4]
	Normal	≤25 μIU/mL	
	High	>25 μIU/mL	
	Glycated haemoglobin (HbA1c)		[3]
	Normal	≤6%	
	High	>6%	
Haemodynamic variables	**Systolic blood pressure (SBP)**		[5]
	Normal	<140 mmHg	
	High	≥140 mmHg	
	Diastolic blood pressure (DBP)		[5]
	Normal	<90 mmHg	
	High	≥90 mmHg	

SUPPLEMENTARY FIGURES

Figure S1. Scatterplots of ridge regression performance per clinical outcome in (**a**) females and (**b**) males. Each plot is coloured with a continuous gradient related to the position of each subject (dot) in the distribution of each dietary variable. The gradient is computed on normalised values of the intake of each variable so that an extremely scarce intake gets the value –1 (indigo) and an extremely excessive intake gets the value 1 (dark red). Values within the recommended range are normalised accordingly, with the spectre of yellow denoting a correct intake (delta ≈ 0). Only clinical outcomes with R^2>0.4 according to the ridge regression are reported.

(**a**) Women

Body mass index (BMI)



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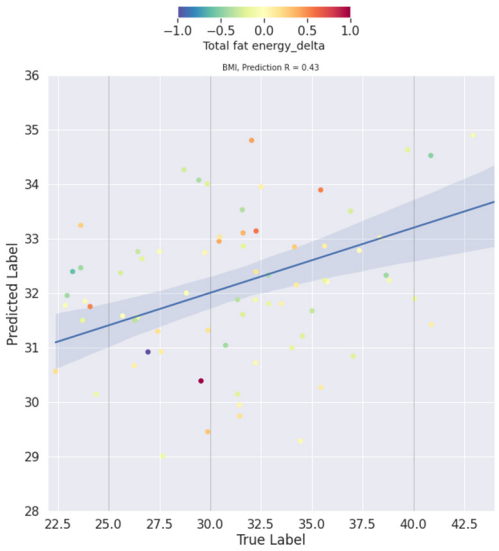
Englyst Fibre Non Starch Polysaccharides (NSP)_delta
BMI, Prediction R = 0.43
Predicted Label
True Label
22.5 25.0 27.5 30.0 32.5 35.0 37.5 40.0 42.5
28 29 30 31 32 33 34 35 36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Total fat energy_delta
BMI, Prediction R = 0.43
Predicted Label
True Label
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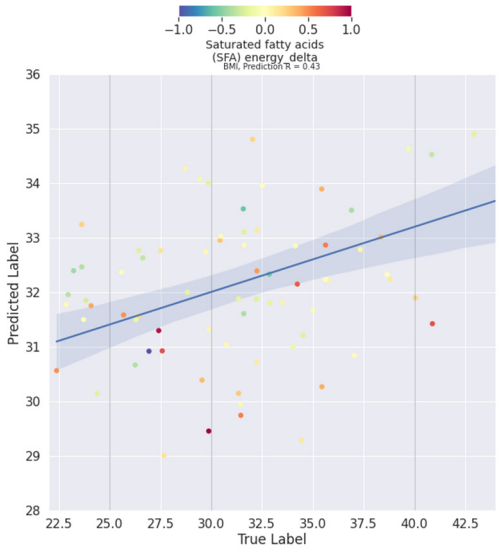
28 29 30 31 32 33 34 35 36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Saturated fatty acids
(SFA) energy_delta
BMI, Prediction R = 0.43
Predicted Label
True Label
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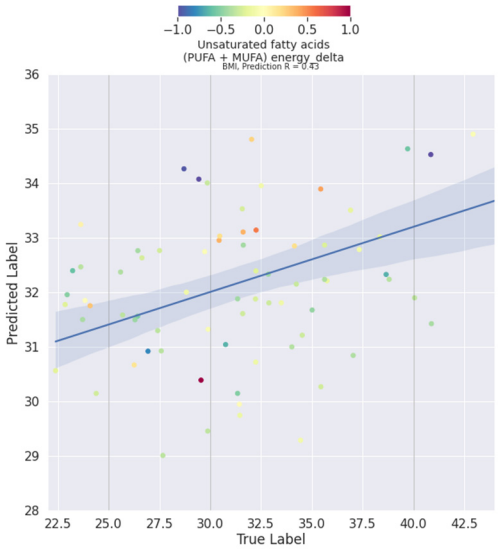
28 29 30 31 32 33 34 35 36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Unsaturated fatty acids
(PUFA + MUFA) energy_delta
BMI, Prediction R = 0.43
Predicted Label
True Label
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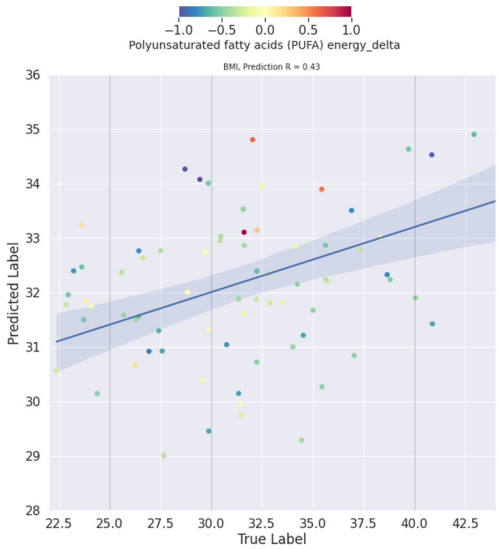
28 29 30 31 32 33 34 35 36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Polyunsaturated fatty acids (PUFA) energy_delta
BMI, Prediction R = 0.43
Predicted Label
True Label
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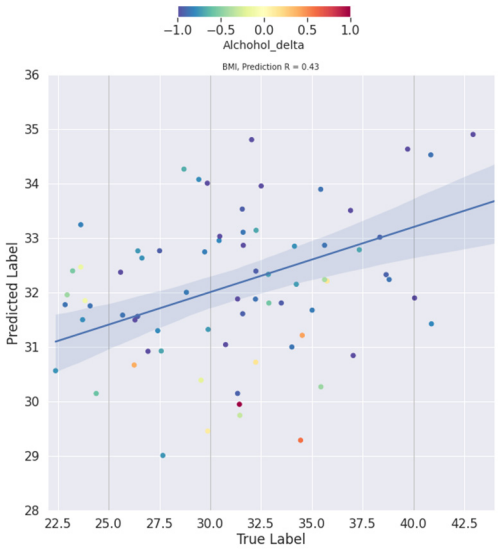
28 29 30 31 32 33 34 35 36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Alchohol_delta
BMI, Prediction R = 0.43
Predicted Label
True Label
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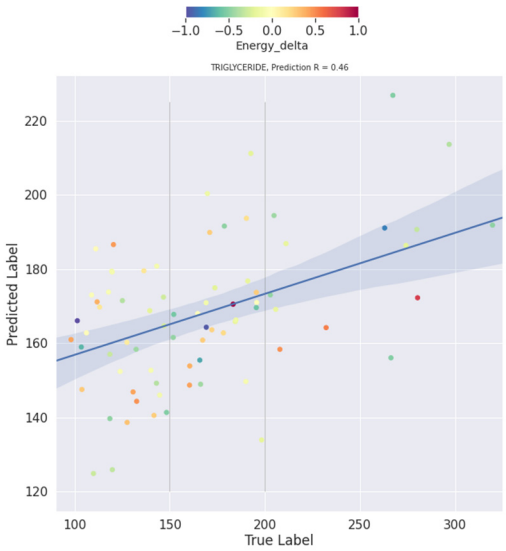
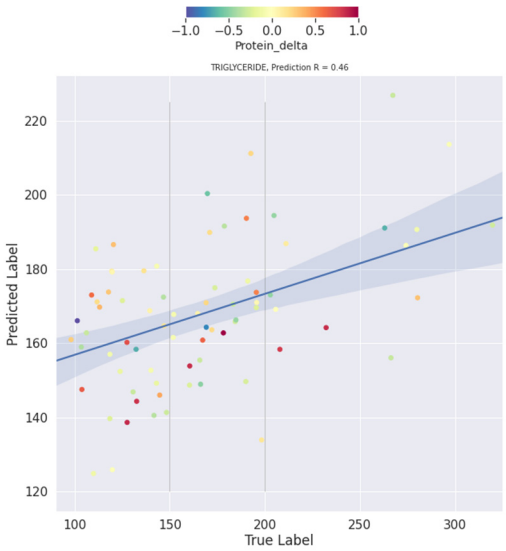
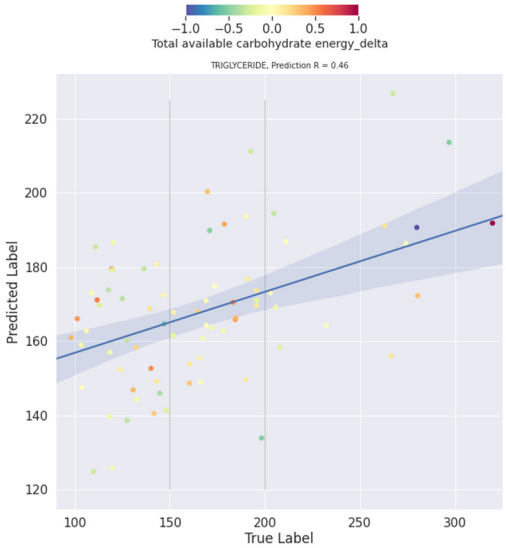
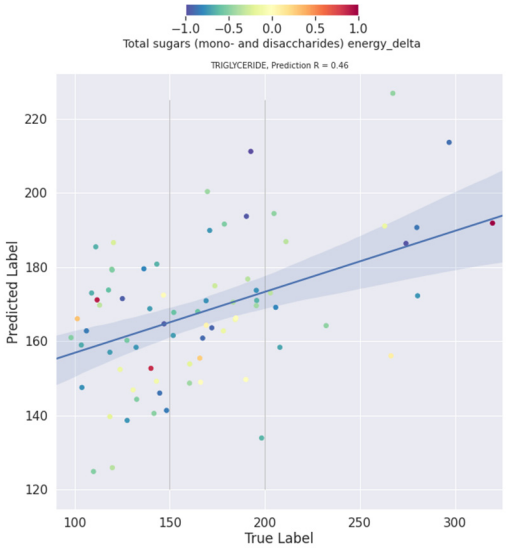
28 29 30 31 32 33 34 35 36

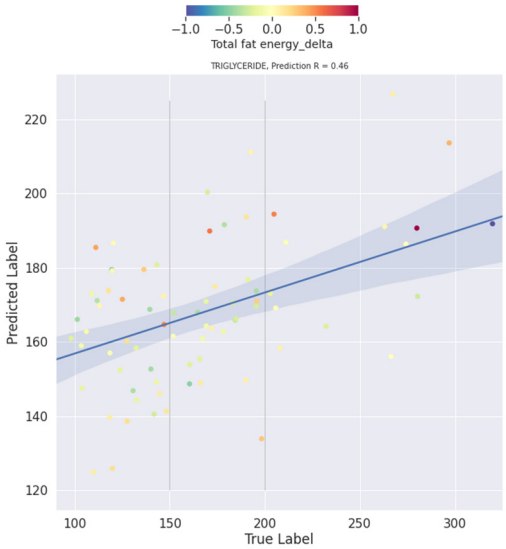
Triglycerides (TG)

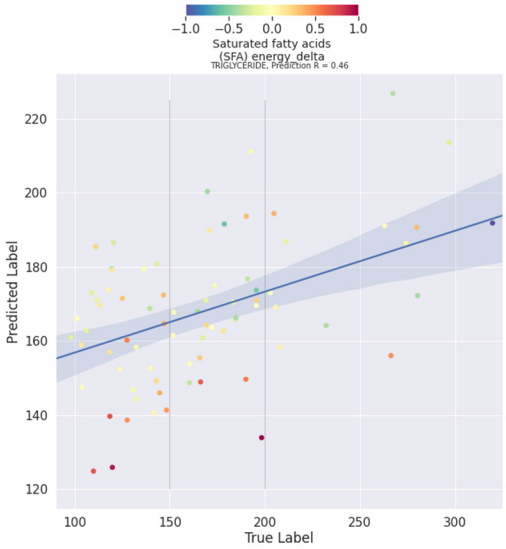


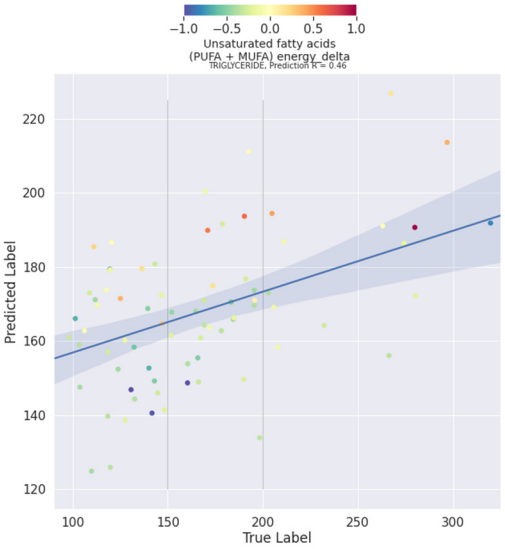


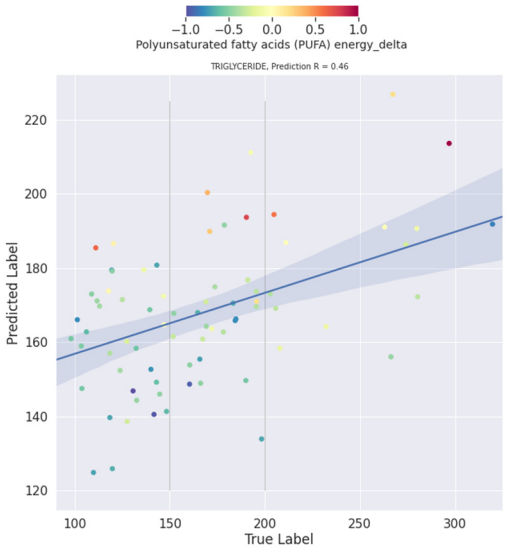


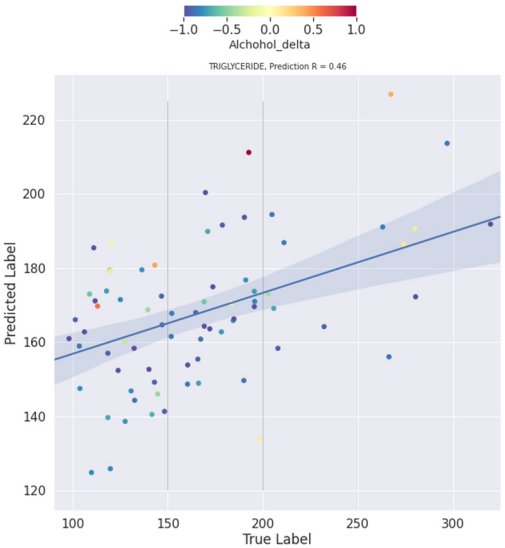




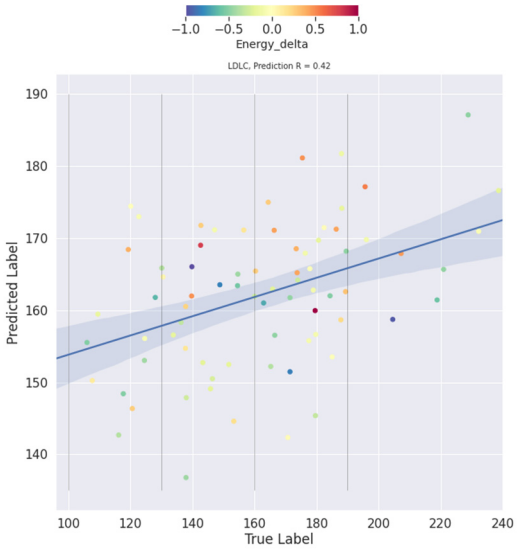


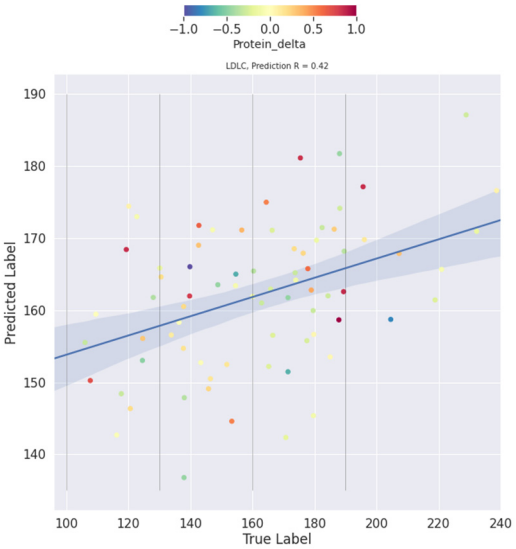


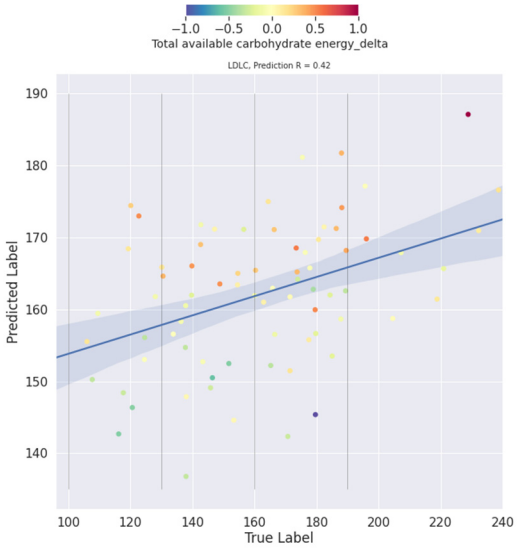




LDL cholesterol (LDL-C)



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Total available carbohydrate energy_delta
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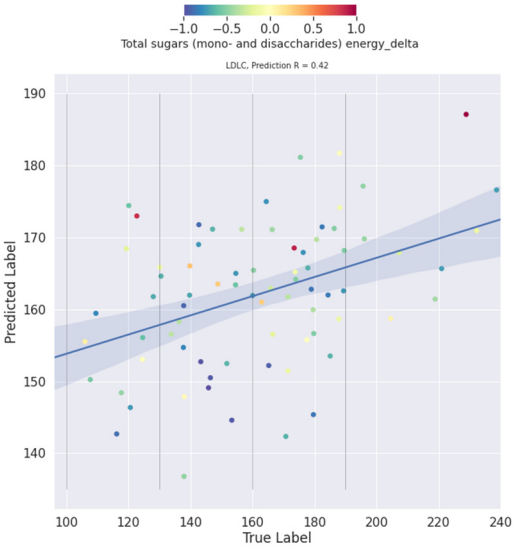
Predicted Label
True Label
190
180
170
160
150
140
100 120 140 160 180 200 220 240


−1.0 −0.5 0.0 0.5 1.0
Total sugars (mono- and disaccharides) energy_delta
LDLC, Prediction R = 0.42
Predicted Label
True Label
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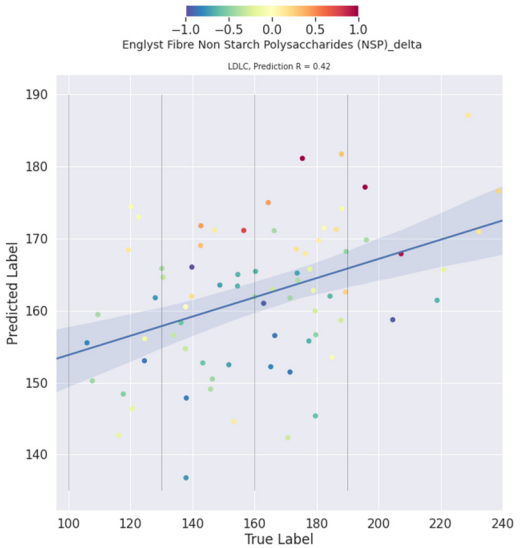
180
170
160
150
140
100 120 140 160 180 200 220 240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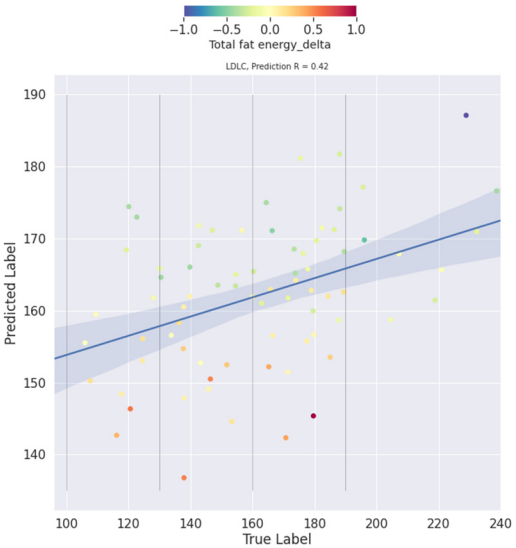
Englyst Fibre Non Starch Polysaccharides (NSP)_delta
LDLC, Prediction R = 0.42
Predicted Label
True Label
190
180
170
160
150
140
100 120 140 160 180 200 220 240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Total fat energy_delta
LDLC, Prediction R = 0.42
Predicted Label
True Label
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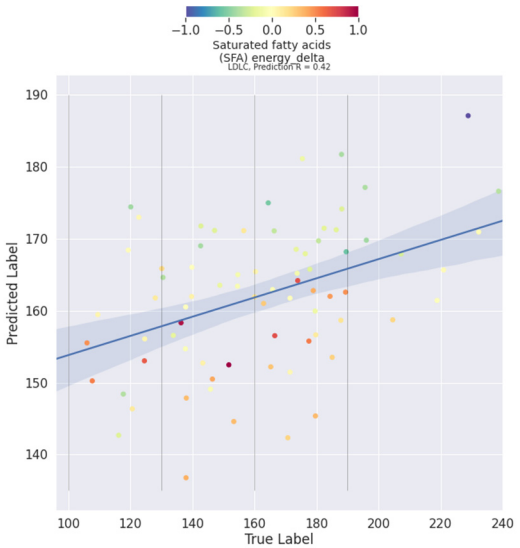
180
170
160
150
140
100 120 140 160 180 200 220 240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Saturated fatty acids
(SFA) energy_delta
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Predicted Label
True Label
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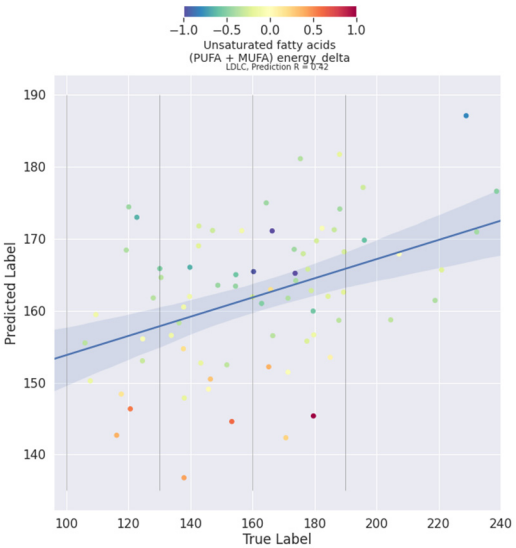
180
170
160
150
140
100 120 140 160 180 200 220 240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Unsaturated fatty acids
(PUFA + MUFA) energy_delta
LDLC, Prediction R = 0.42
Predicted Label
True Label
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180
170
160
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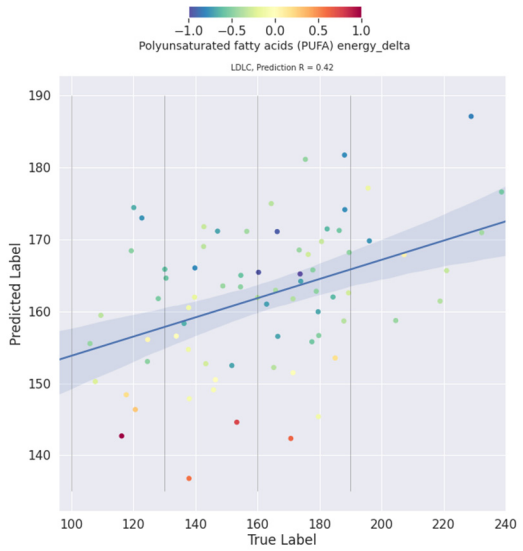
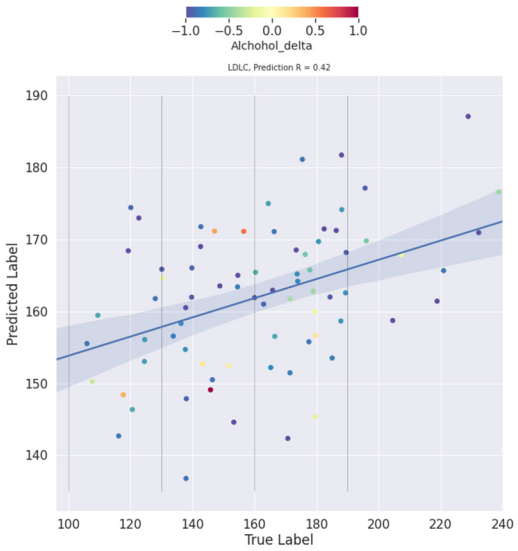
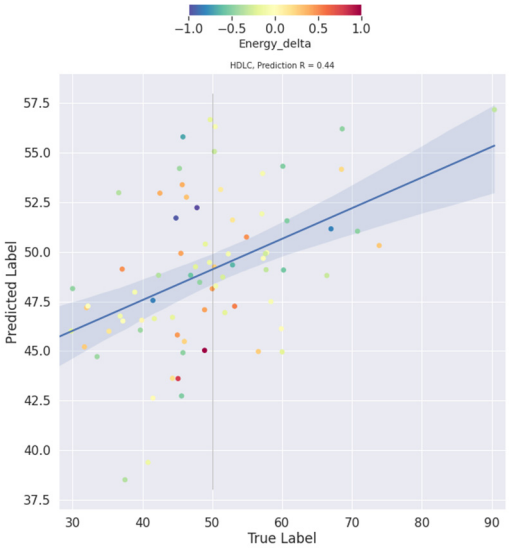
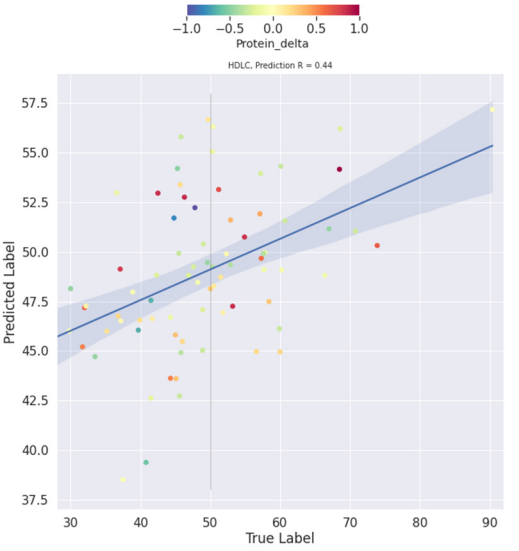
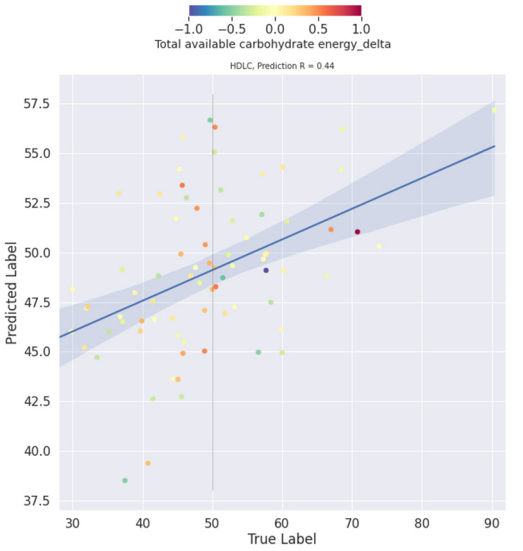


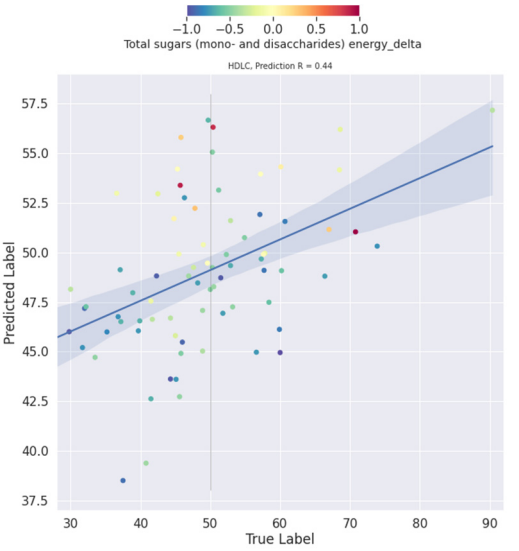


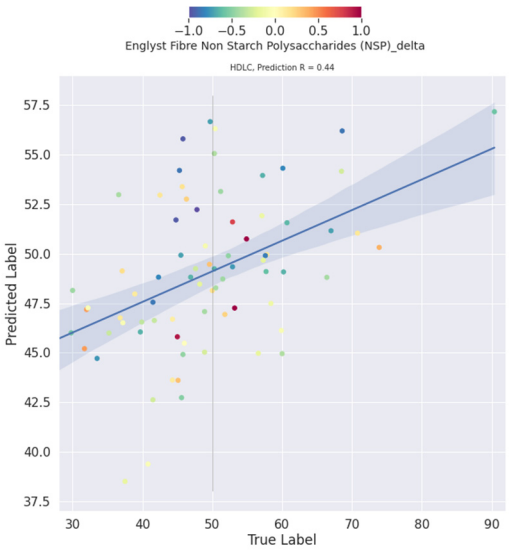
HDL cholesterol (HDL-C)







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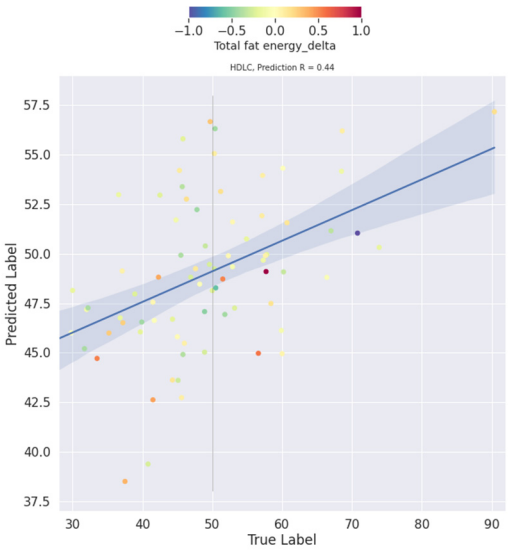
Englyst Fibre Non Starch Polysaccharides (NSP)_delta
HDLC, Prediction R = 0.44
Predicted Label
True Label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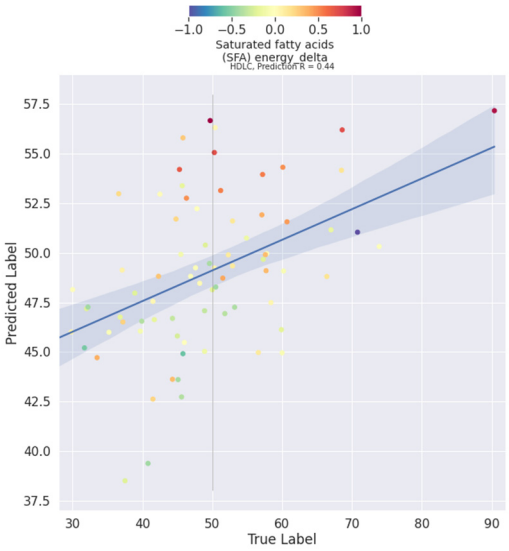
Total fat energy_delta
HDLC, Prediction R = 0.44
Predicted Label
True Label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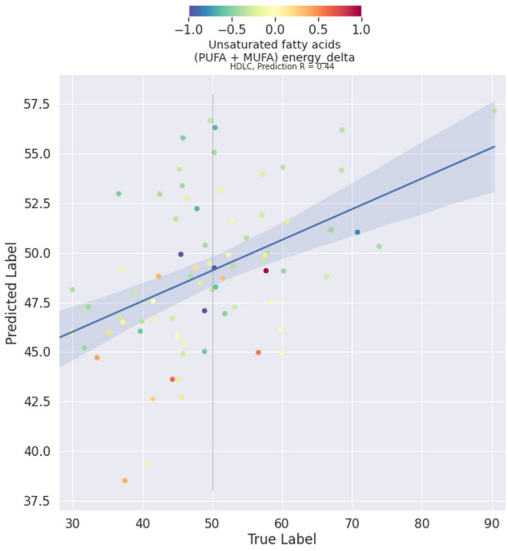
Saturated fatty acids
(SFA) energy_delta
HDLC, Prediction R = 0.44
Predicted Label
True Label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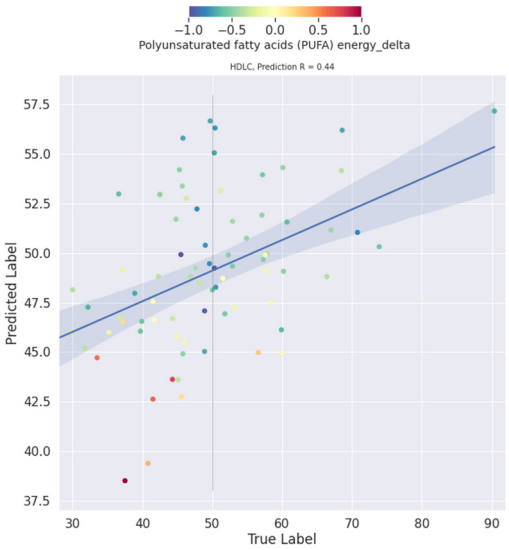
Unsaturated fatty acids
(PUFA + MUFA) energy_delta
HDLC, Prediction R = 0.44
Predicted Label
True Label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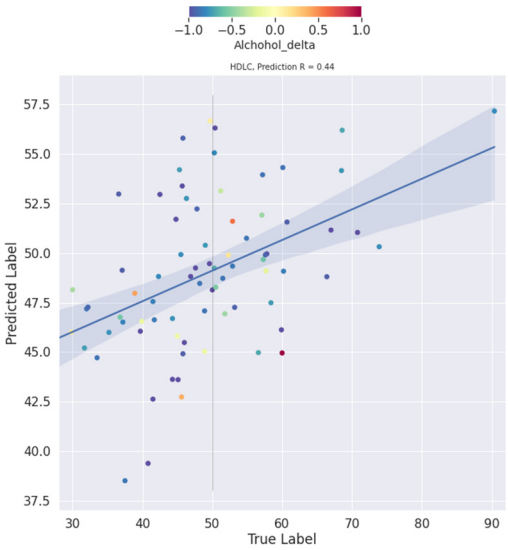
Polyunsaturated fatty acids (PUFA) energy_delta
HDLC, Prediction R = 0.44
Predicted Label
True Label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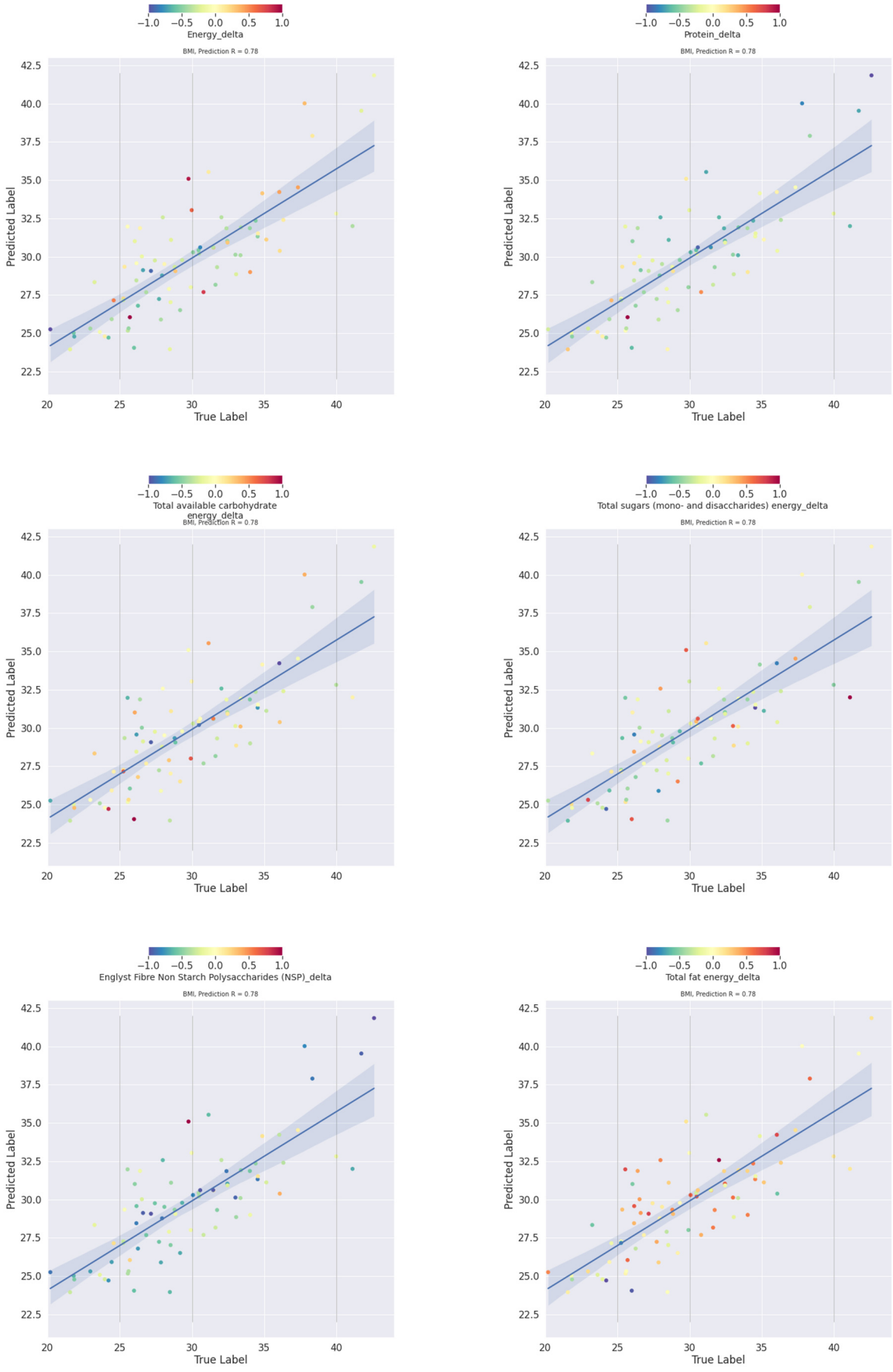
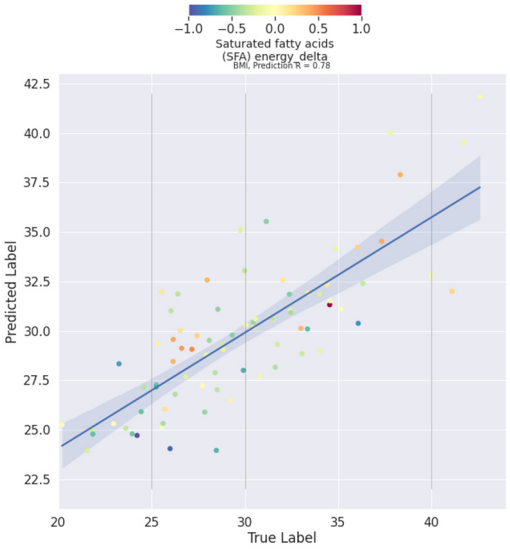
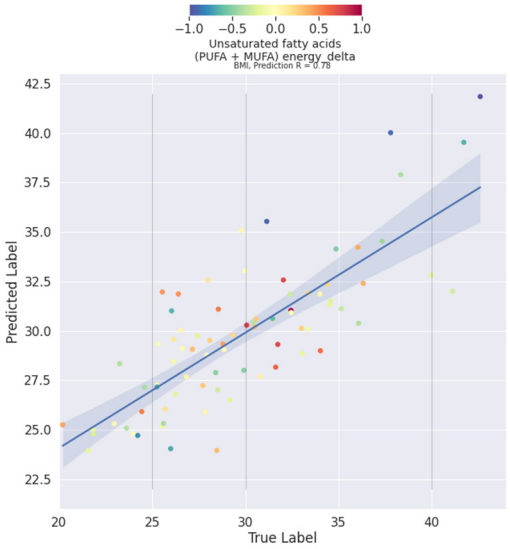
Alchohol_delta
HDLC, Prediction R = 0.44
Predicted Label
True Label

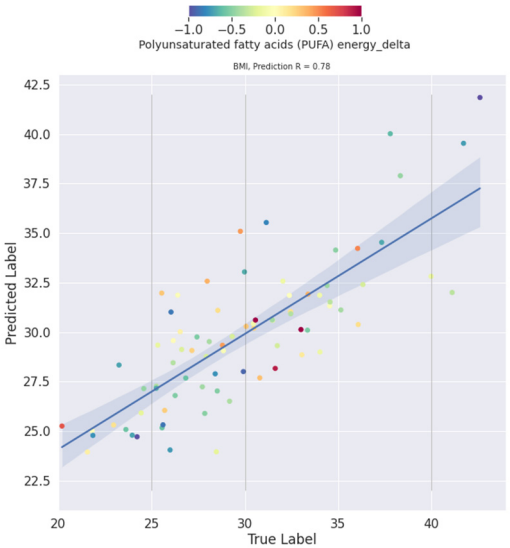
(**b**) Men

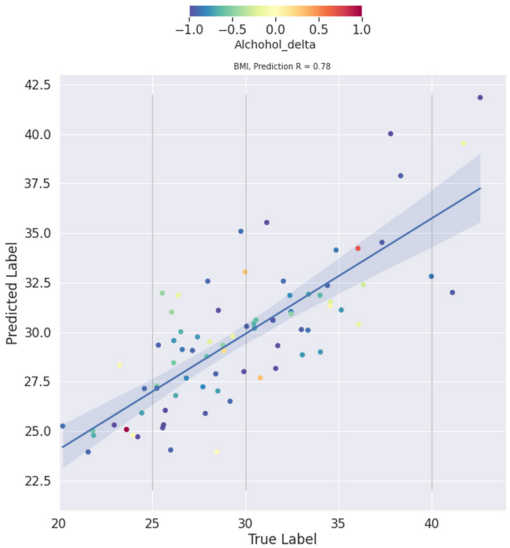
Body mass index (BMI)



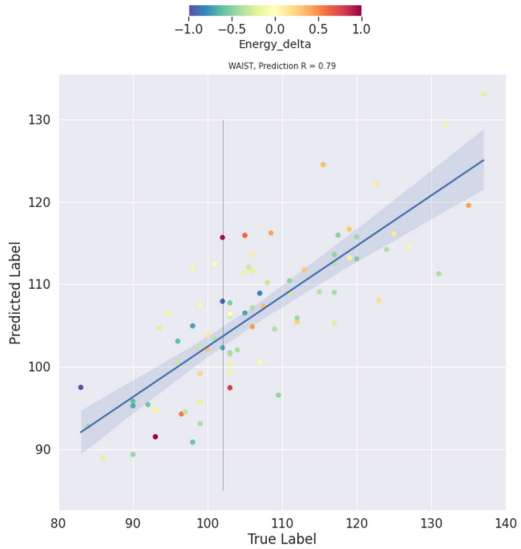


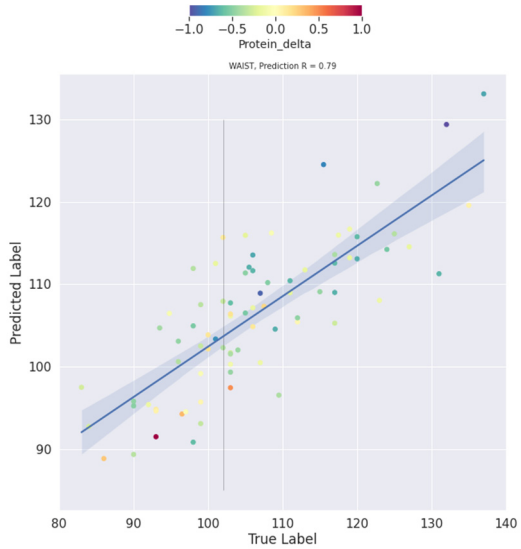


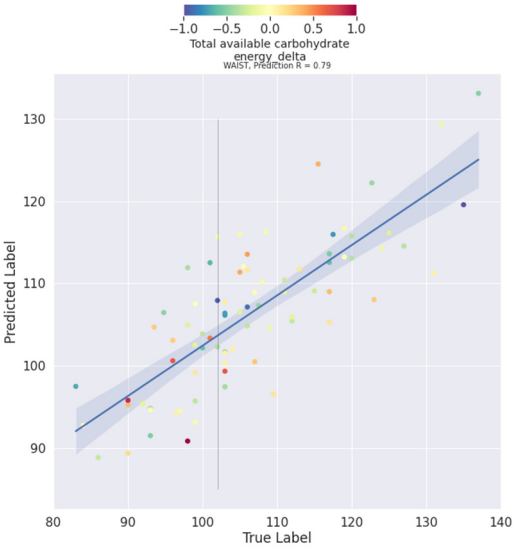


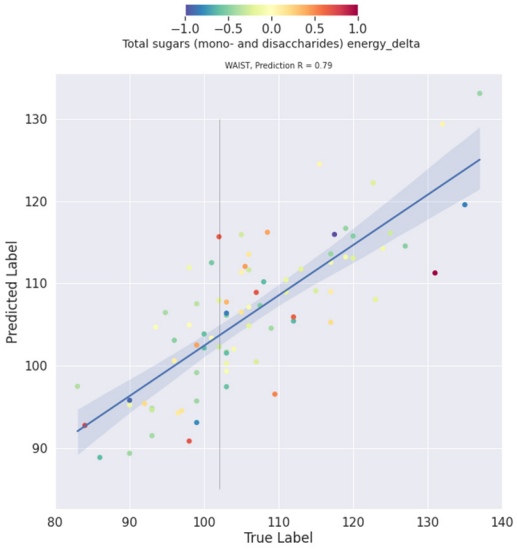


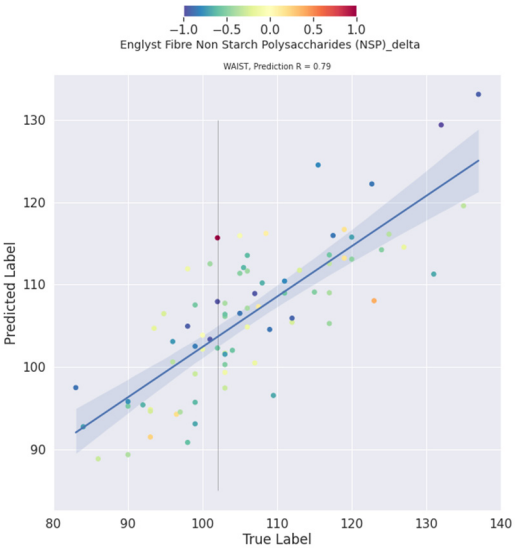
Waist circumference (WC)

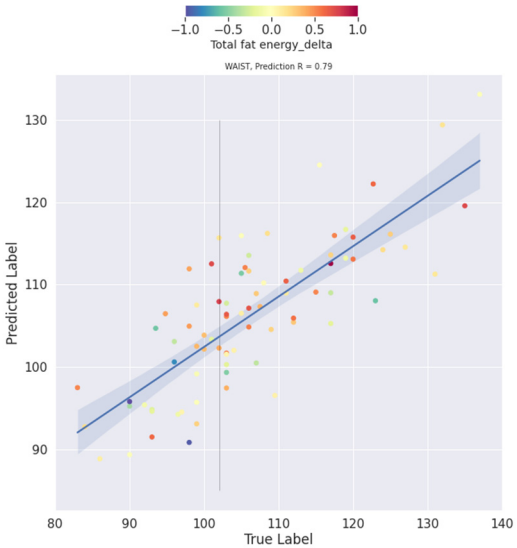


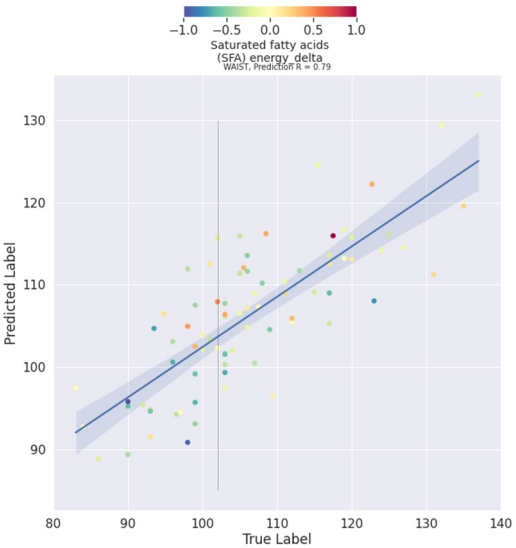


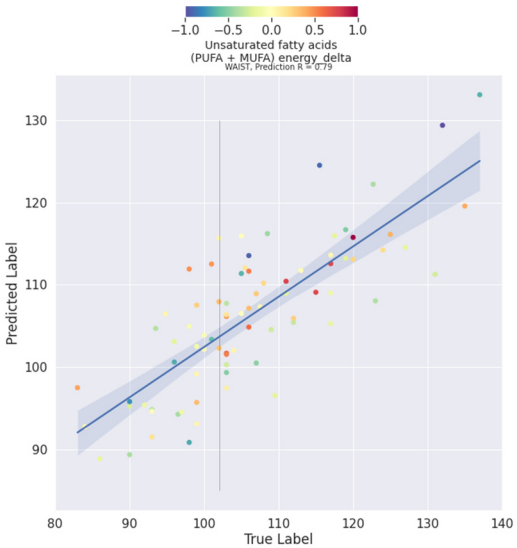

Total available carbohydrate energy_delta
WAIST, Prediction R = 0.79
Predicted Label
True Label

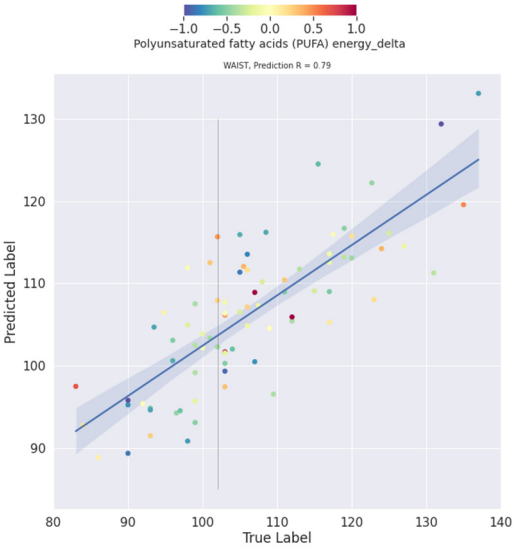

Total sugars (mono- and disaccharides) energy_delta
WAIST, Prediction R = 0.79
Predicted Label
True Label

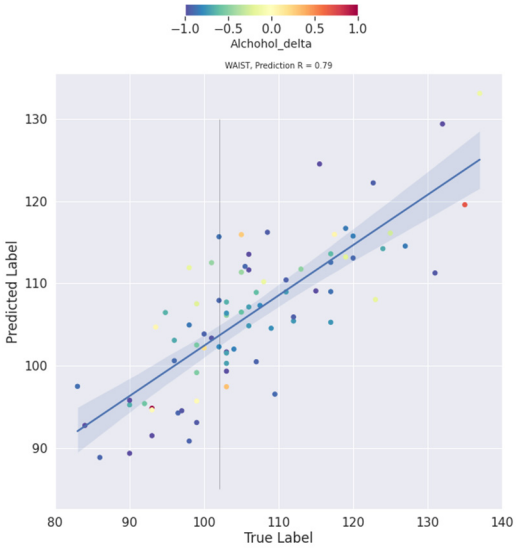

Englyst Fibre Non Starch Polysaccharides (NSP)_delta
WAIST, Prediction R = 0.79
Predicted Label
True Label


Total fat energy_delta
WAIST, Prediction R = 0.79
Predicted Label
True Label

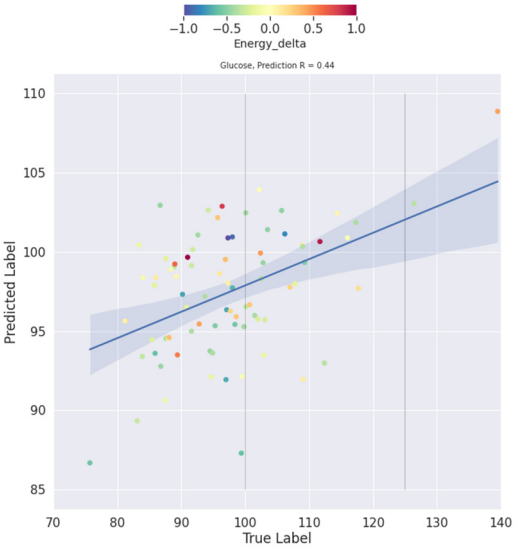

Saturated fatty acids (SFA) energy_delta
WAIST, Prediction R = 0.79
Predicted Label
True Label

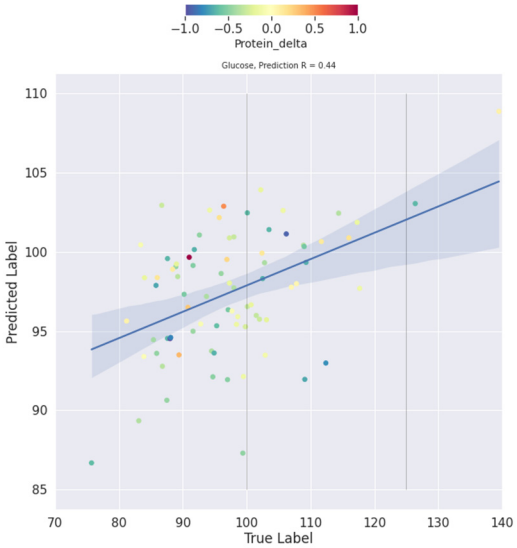

Unsaturated fatty acids (PUFA + MUFA) energy_delta
WAIST, Prediction R = 0.79
Predicted Label
True Label

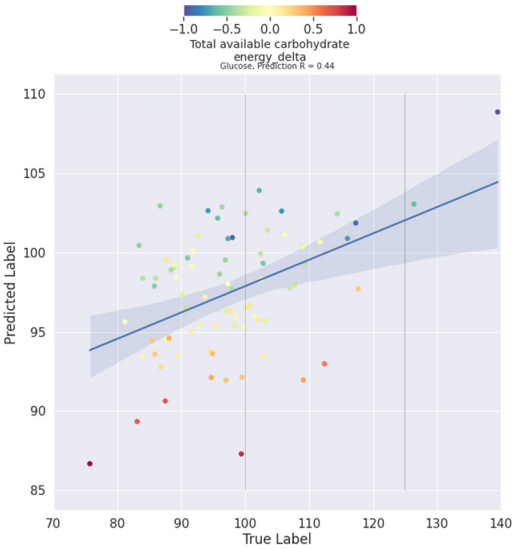


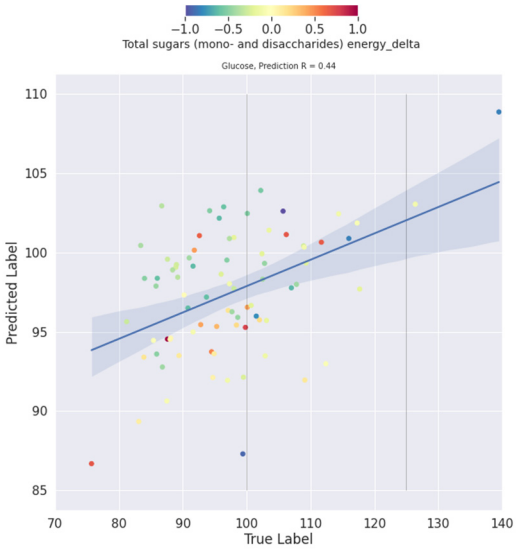


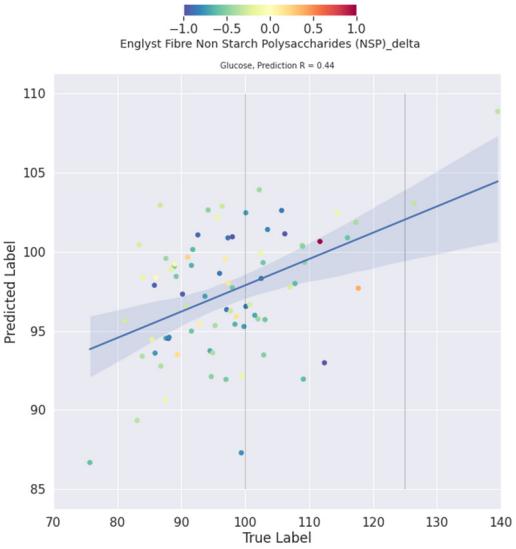
Fasting glucose

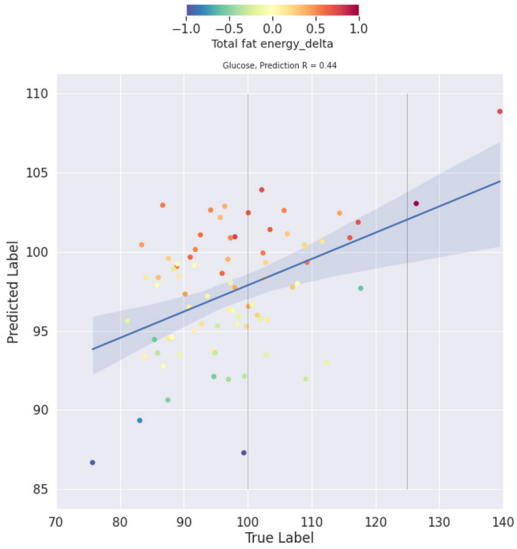









−1.0 −0.5 0.0 0.5 1.0
Englyst Fibre Non Starch Polysaccharides (NSP)_delta
Glucose, Prediction R = 0.44
Predicted Label
True Label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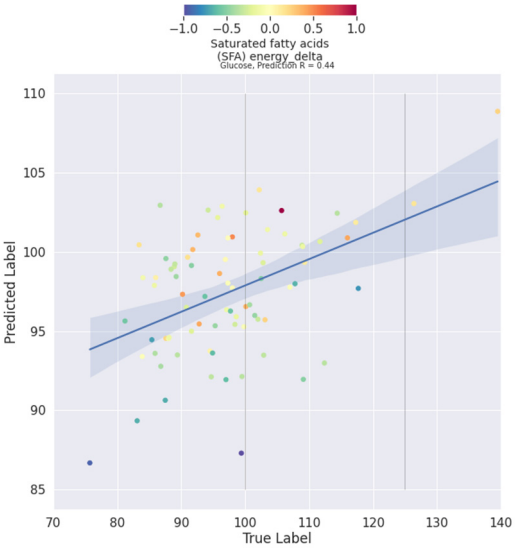
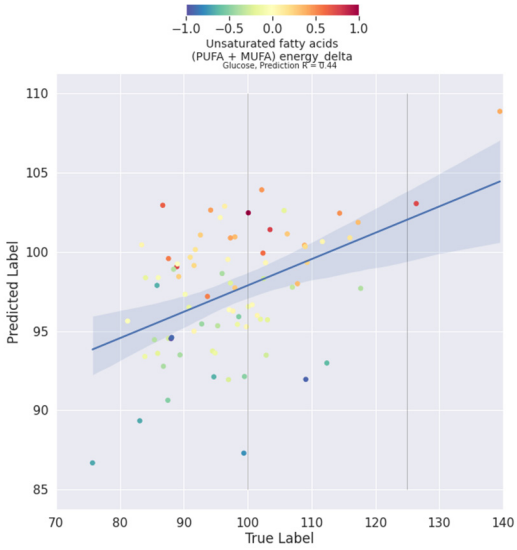
Total fat energy_delta
Glucose, Prediction R = 0.44
Predicted Label
True Label


−1.0 −0.5 0.0 0.5 1.0
Saturated fatty acids
(SFA) energy_delta
Glucose, Prediction R = 0.44
Predicted Label
True Label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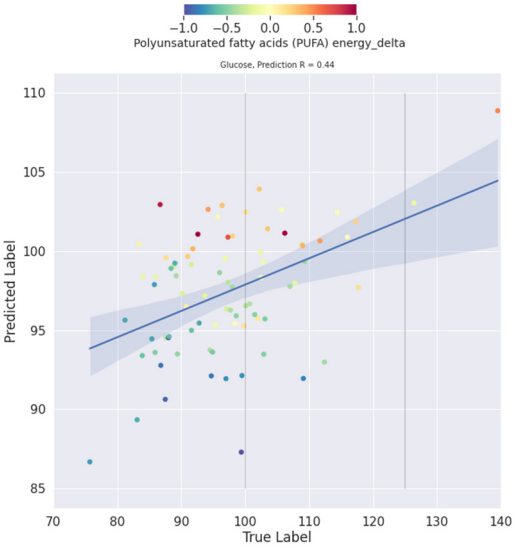
Unsaturated fatty acids
(PUFA + MUFA) energy_delta
Glucose, Prediction R = 0.44
Predicted Label
True Label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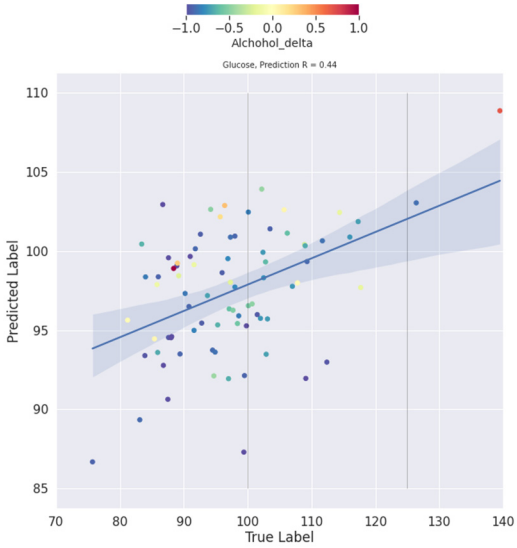
Polyunsaturated fatty acids (PUFA) energy_delta
Glucose, Prediction R = 0.44
Predicted Label
True Label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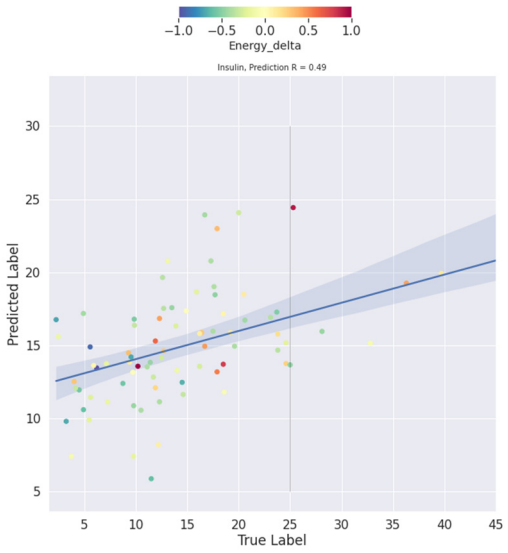
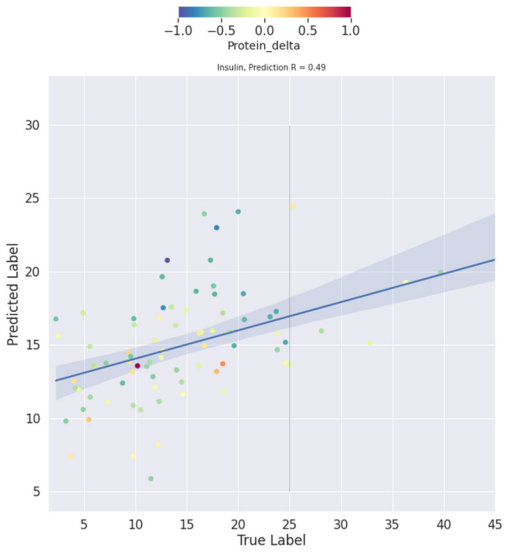
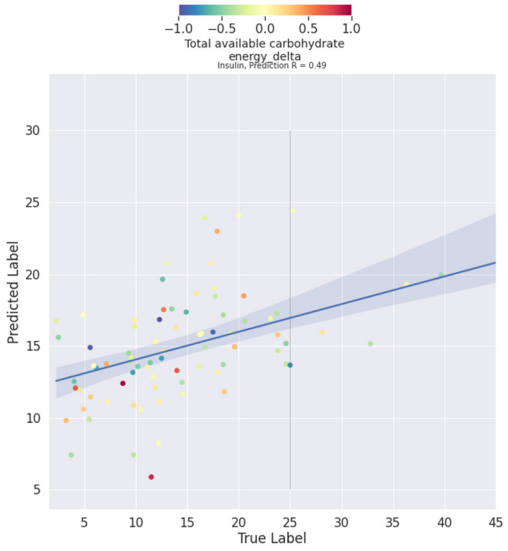
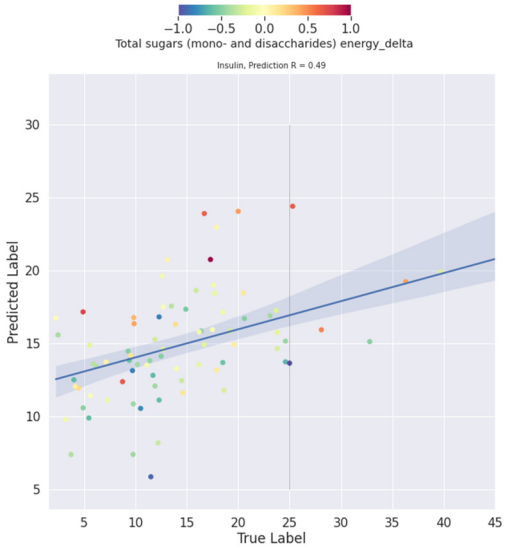
Alchohol_delta
Glucose, Prediction R = 0.44
Predicted Label
True Label

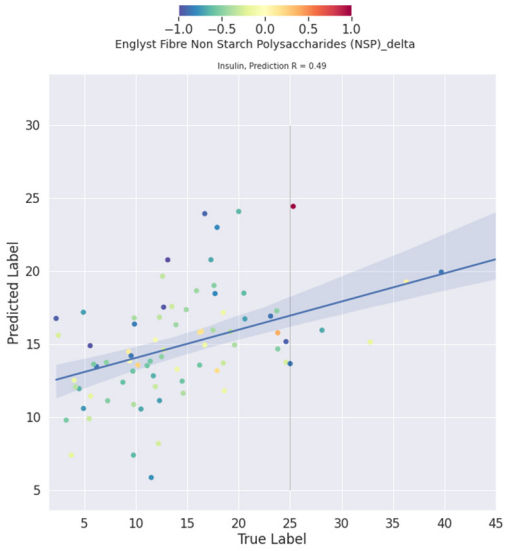
Fasting insulin

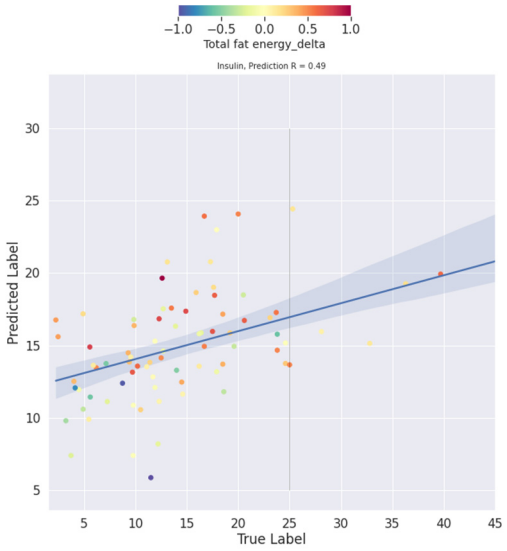


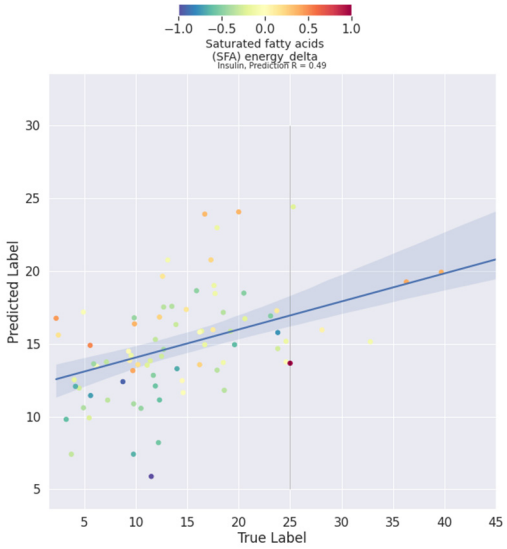


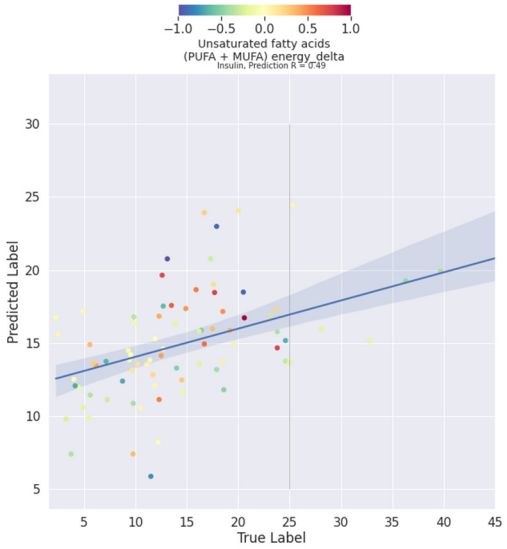


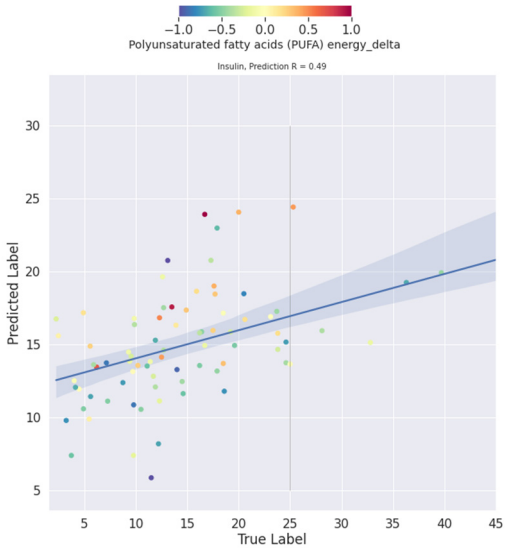


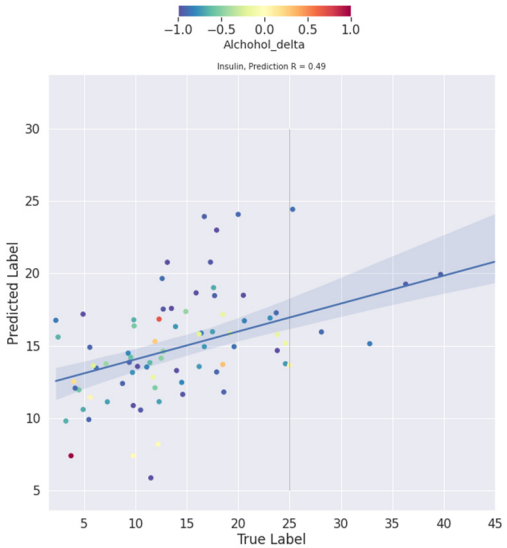




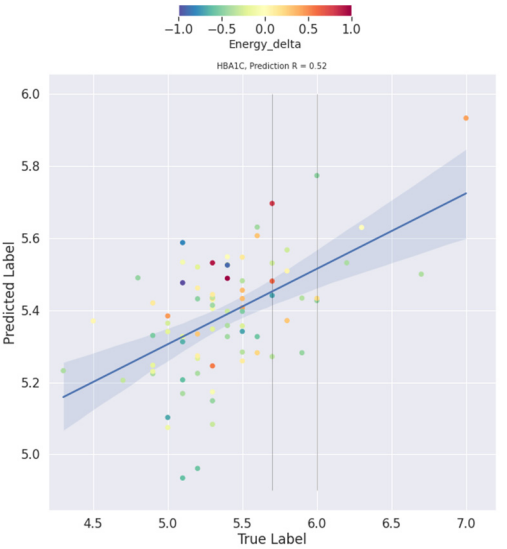


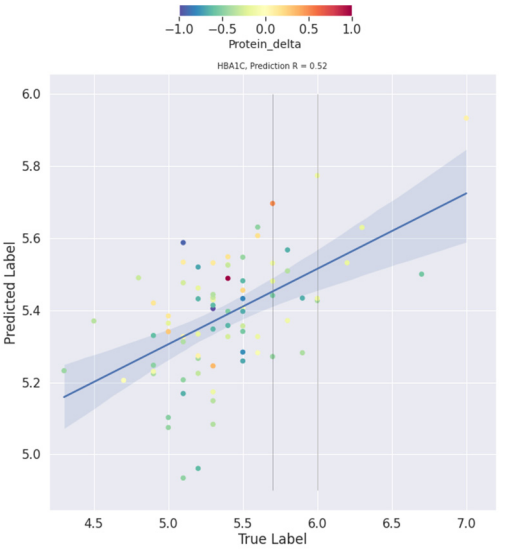


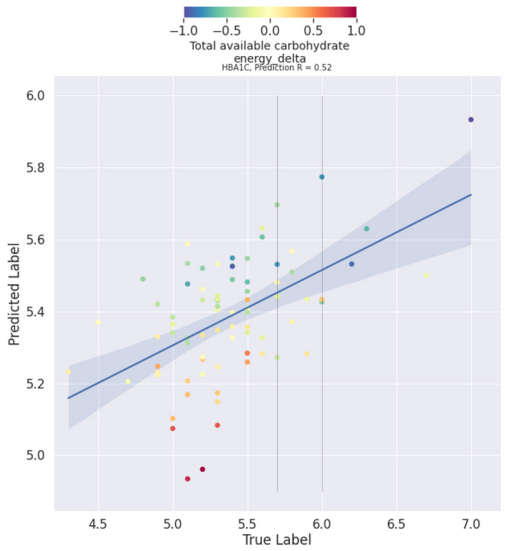


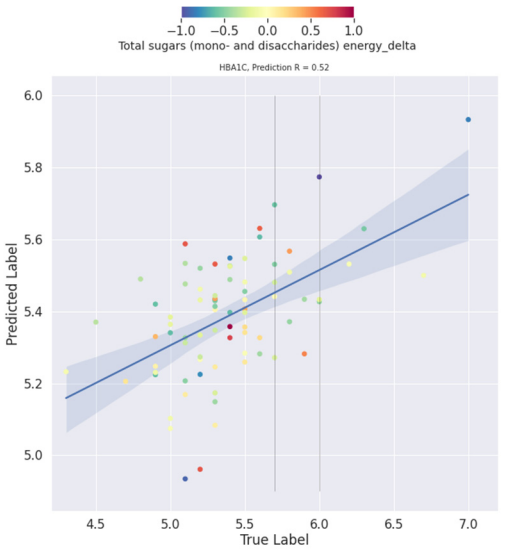


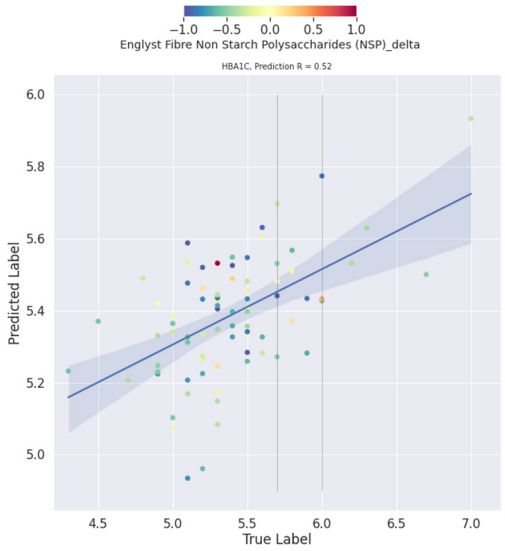
Glycated haemoglobin (HbA1c)

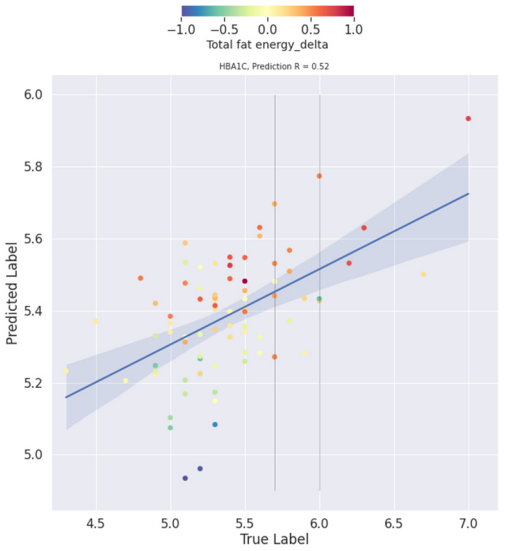


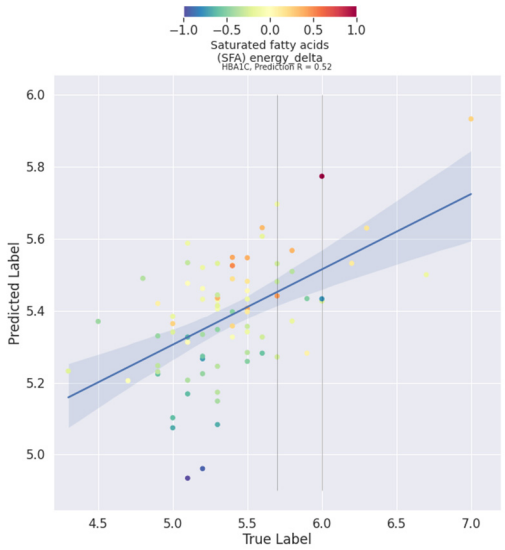


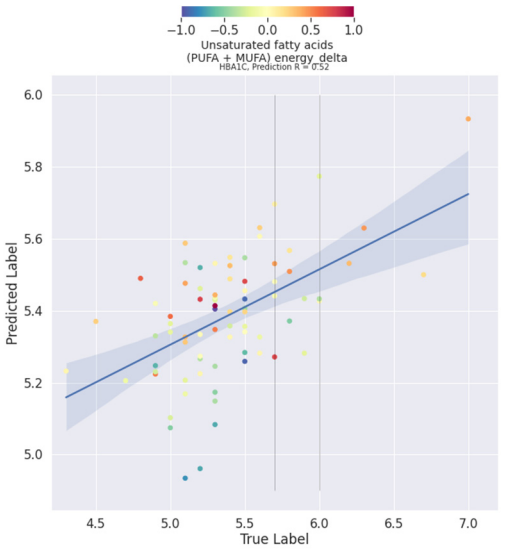

Total available carbohydrate
energy_delta
HBA1C, Prediction R = 0.52
Predicted Label
True Label

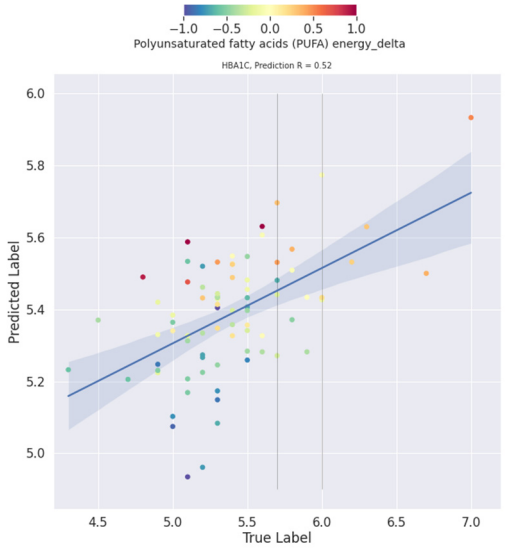

Total sugars (mono- and disaccharides) energy_delta
HBA1C, Prediction R = 0.52
Predicted Label
True Label

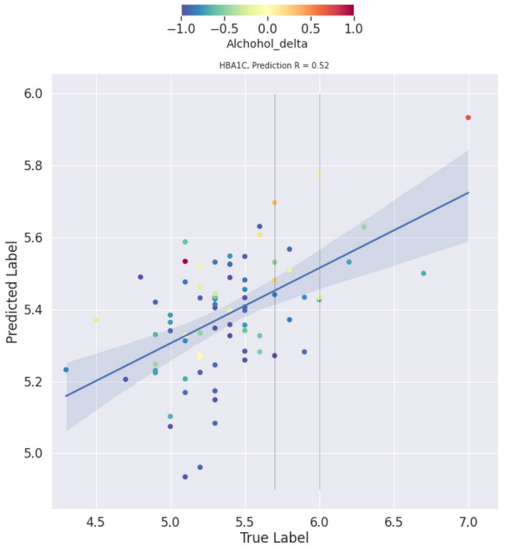

Englyst Fibre Non Starch Polysaccharides (NSP)_delta
HBA1C, Prediction R = 0.52
Predicted Label
True Label


Total fat energy_delta
HBA1C, Prediction R = 0.52
Predicted Label
True Label

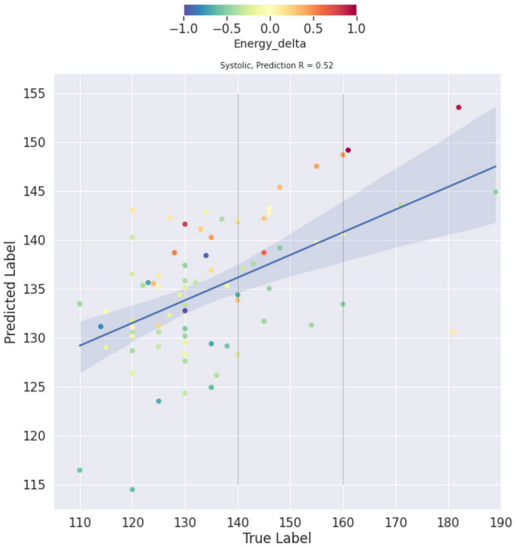

Saturated fatty acids
(SFA) energy_delta
HBA1C, Prediction R = 0.52
Predicted Label
True Label

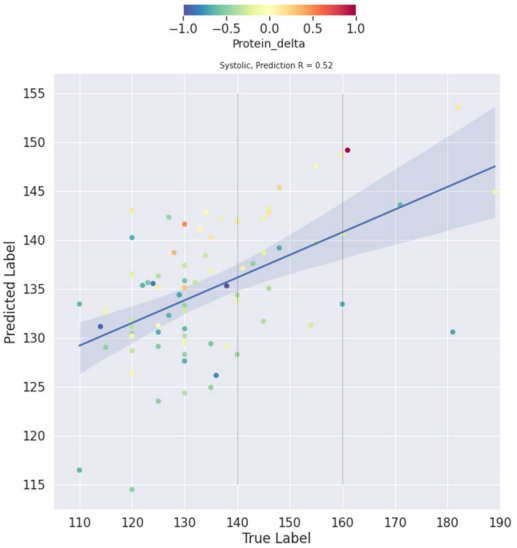

Unsaturated fatty acids
(PUFA + MUFA) energy_delta
HBA1C, Prediction R = 0.52
Predicted Label
True Label

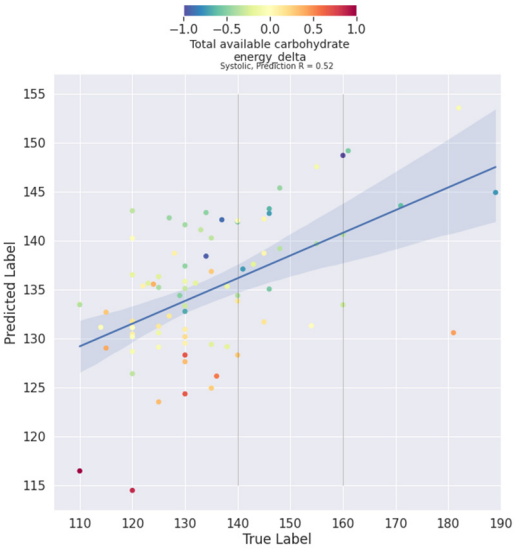


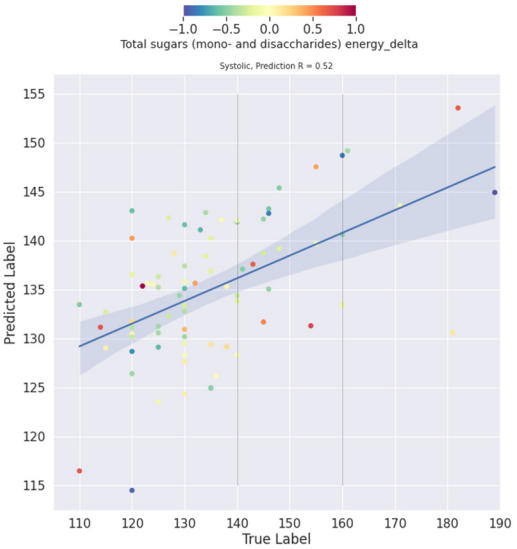


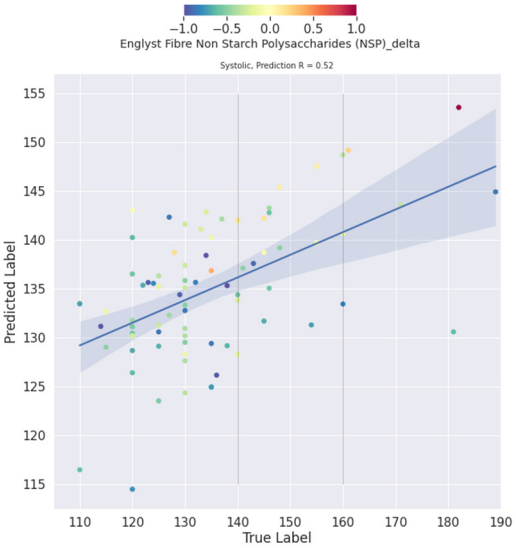
Systolic blood pressure (SBP)

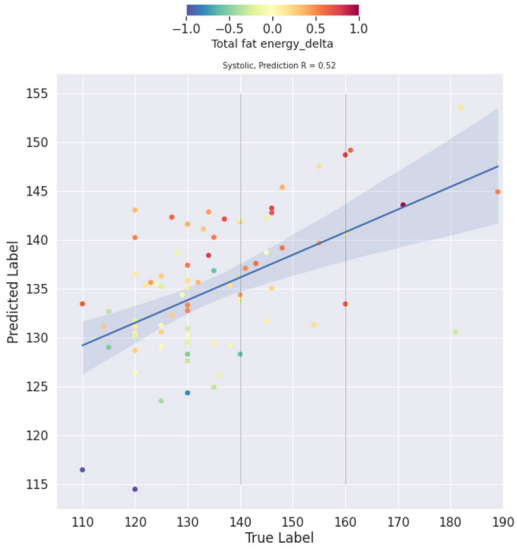


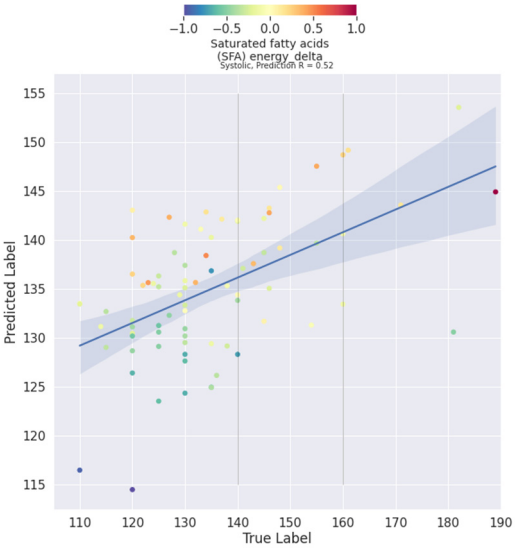


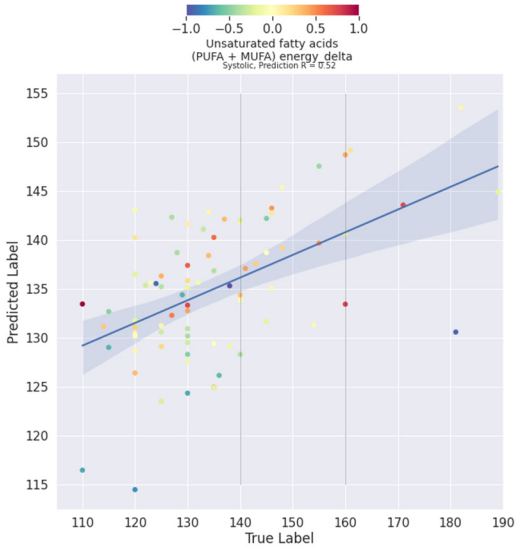


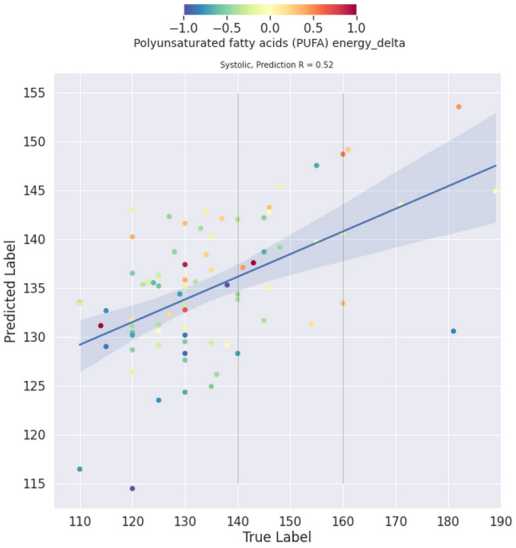



−1.0 −0.5 0.0 0.5 1.0
Englyst Fibre Non Starch Polysaccharides (NSP)_delta
Systolic, Prediction R = 0.52
Predicted Label
True Label


−1.0 −0.5 0.0 0.5 1.0
Total fat energy_delta
Systolic, Prediction R = 0.52
Predicted Label
True Label


−1.0 −0.5 0.0 0.5 1.0
Saturated fatty acids
(SFA) energy_delta
Systolic, Prediction R = 0.52
Predicted Label
True Label


−1.0 −0.5 0.0 0.5 1.0
Unsaturated fatty acids
(PUFA + MUFA) energy_delta
Systolic, Prediction R = 0.52
Predicted Label
True Label


−1.0 −0.5 0.0 0.5 1.0
Polyunsaturated fatty acids (PUFA) energy_delta
Systolic, Prediction R = 0.52
Predicted Label
True Label

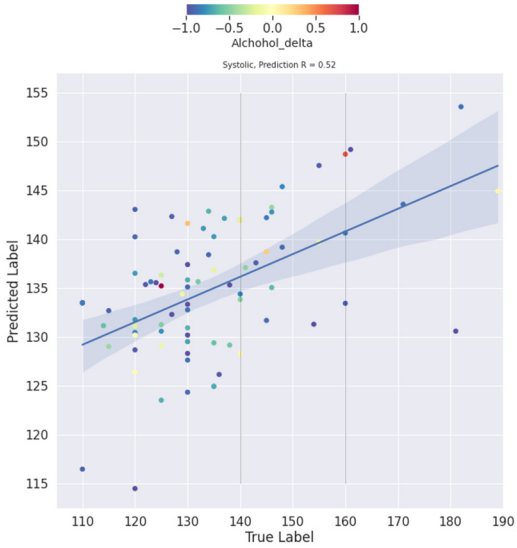
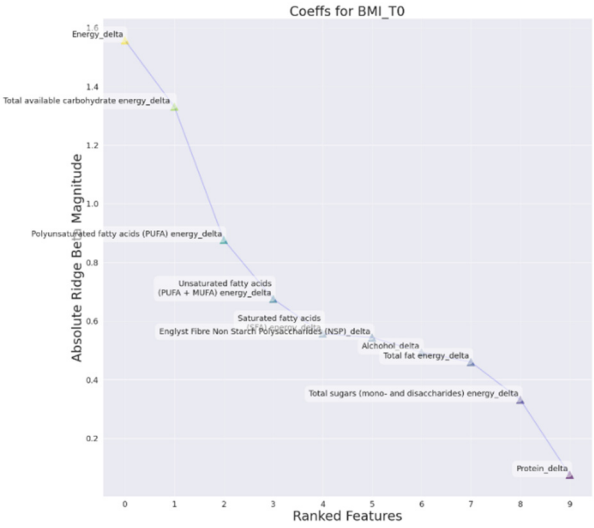

−1.0 −0.5 0.0 0.5 1.0
Alchohol_delta
Systolic, Prediction R = 0.52
Predicted Label
True Label

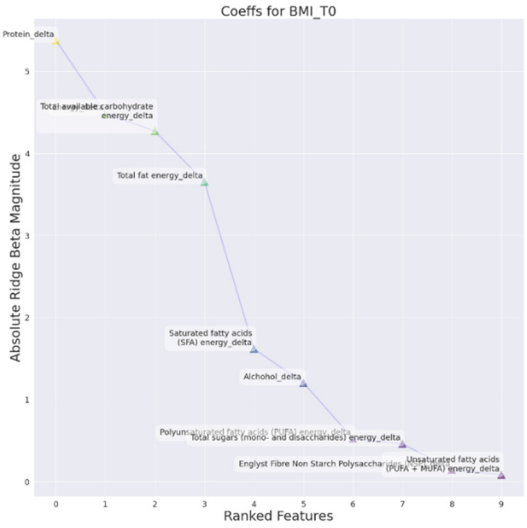
Figure S2. Magnitude of regression coefficients. High magnitude is related to a significant univariate effect on the prediction of the given target.

Women

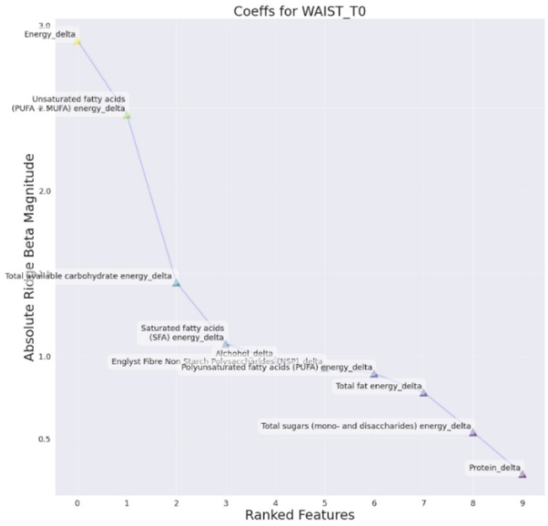
Men

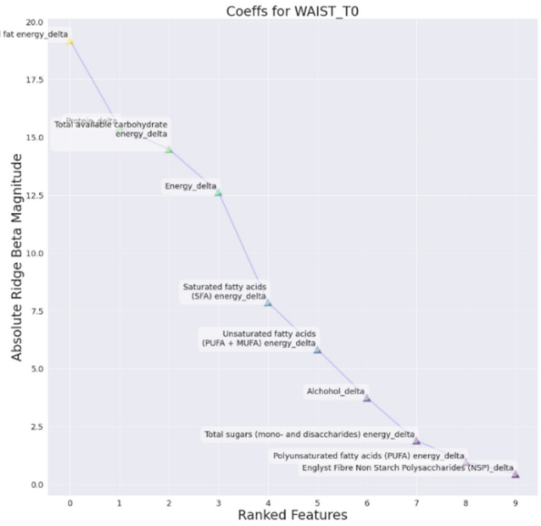
Body mass index (BMI)



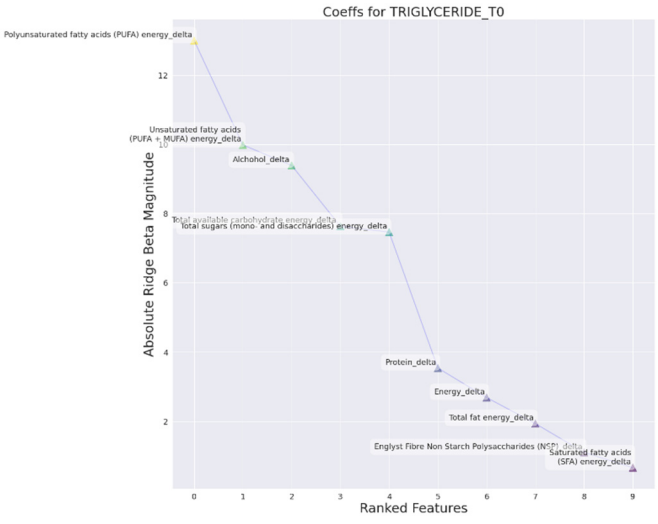


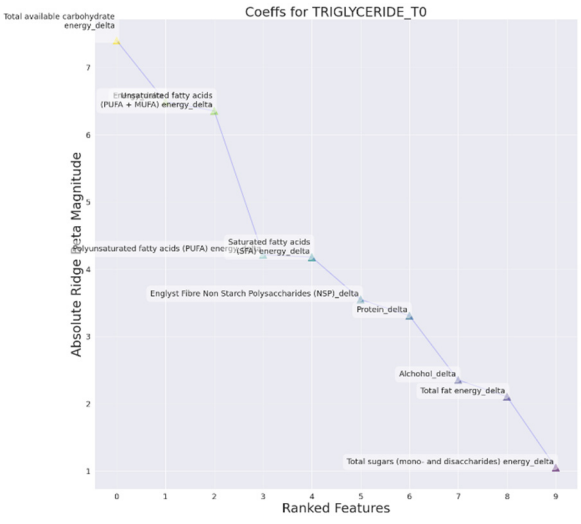
Waist circumference (WC)



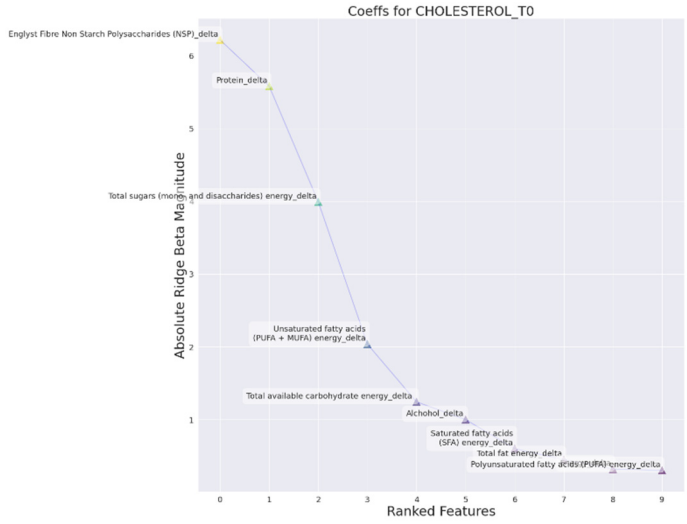


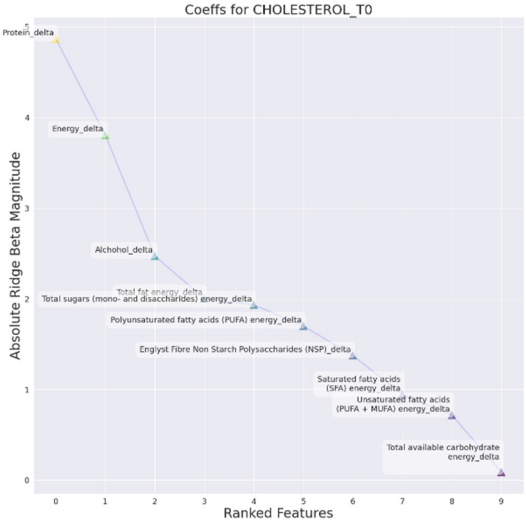
Triglycerides (TG)



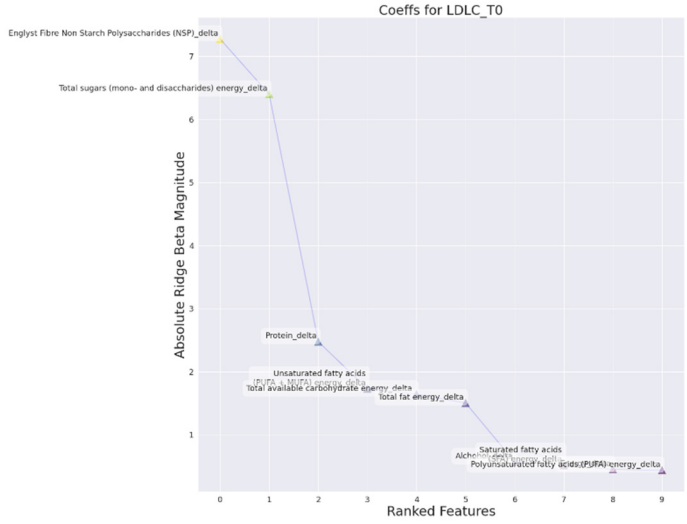


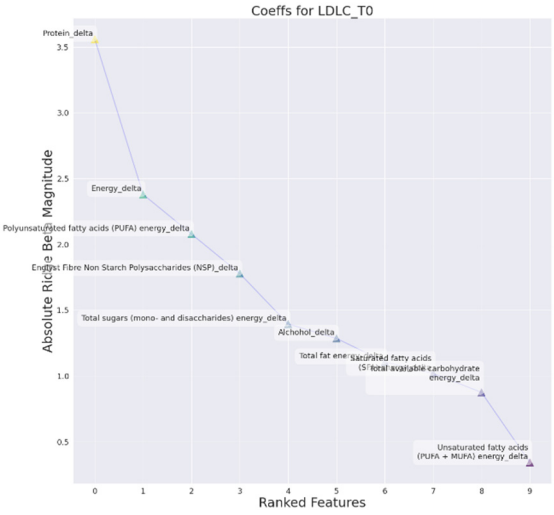
Total cholesterol



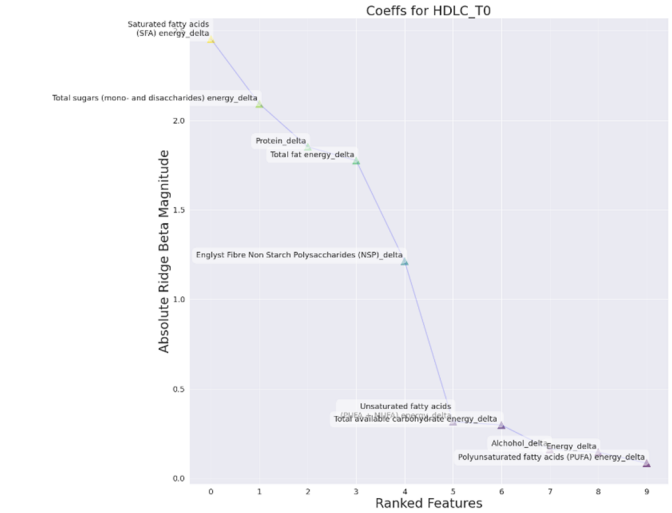


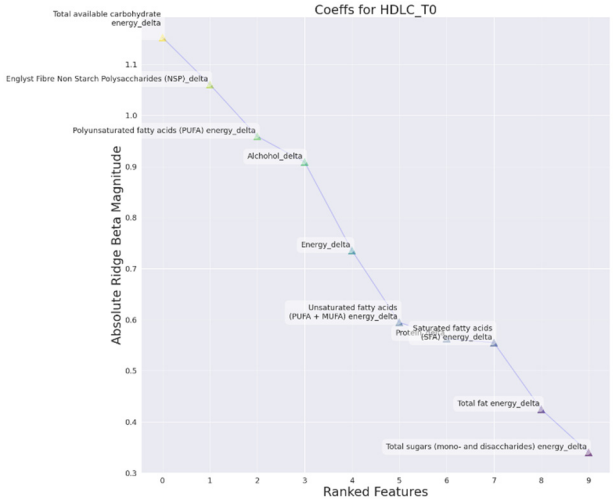
LDL cholesterol (LDL-C)



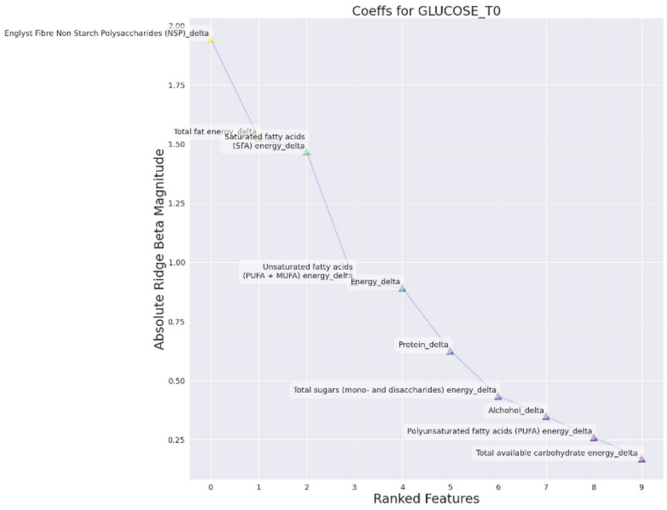


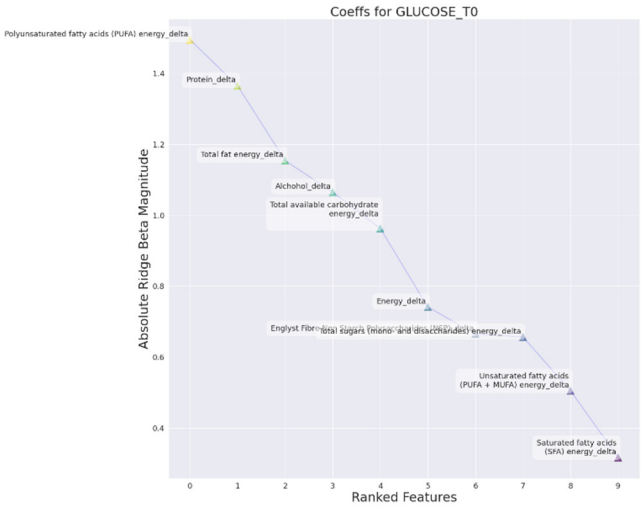
HDL cholesterol (HDL-C)



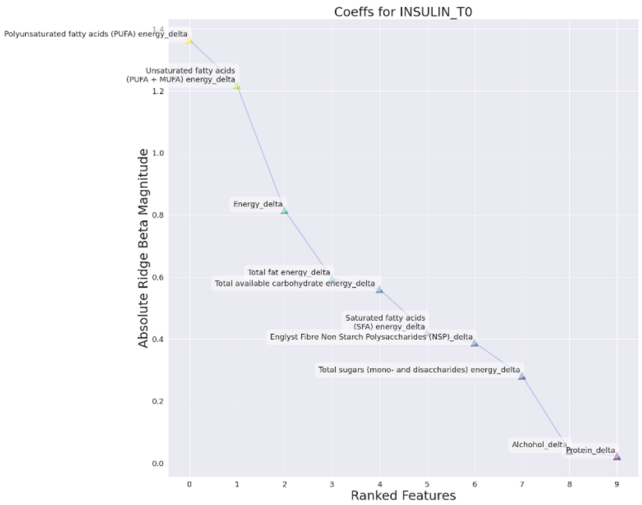


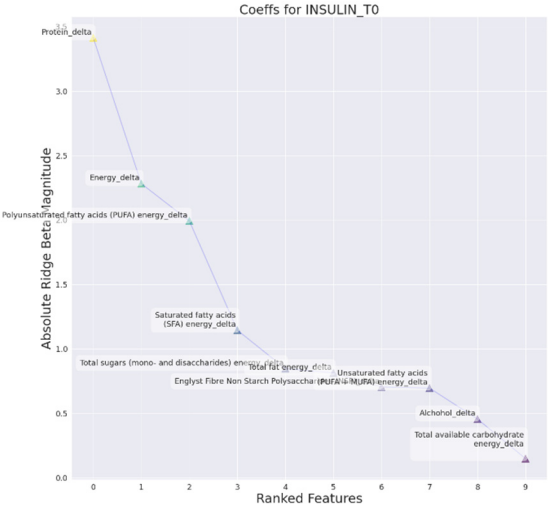
Fasting glucose



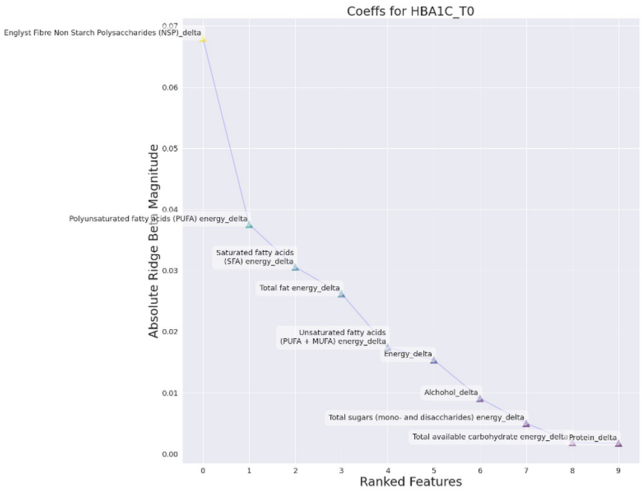


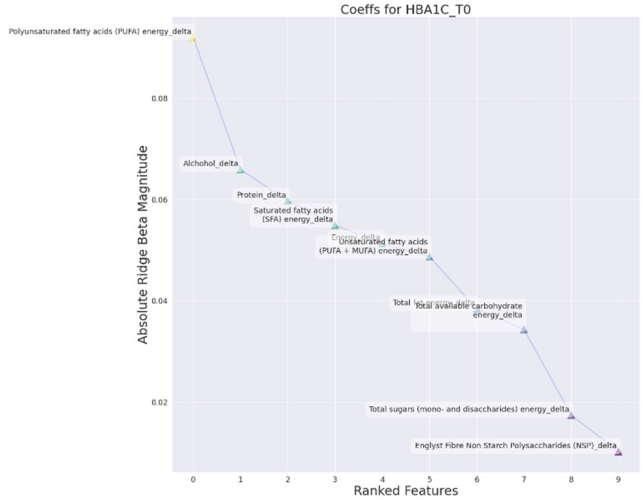
Fasting insulin



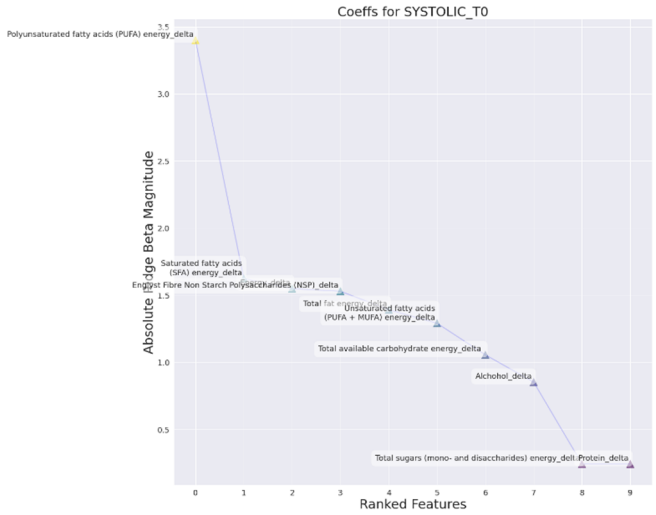


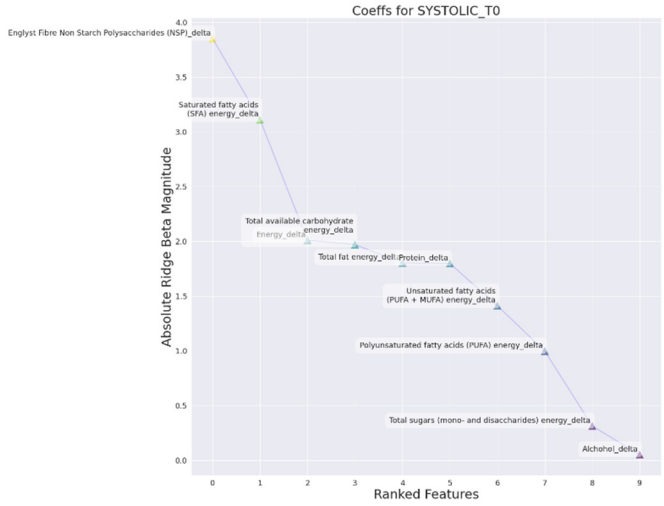
Glycated haemoglobin (HbA1c)



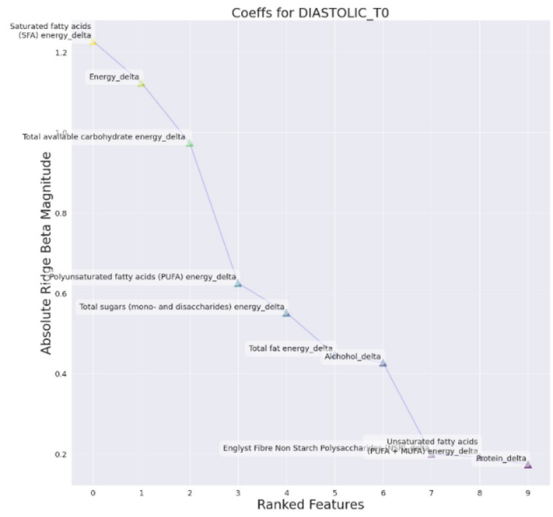


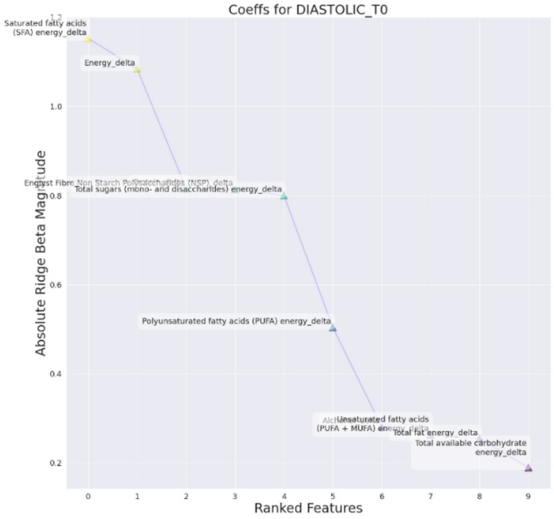
Systolic blood pressure (SBP)





Diastolic blood pressure (DBP)





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