

1 **Supplementary information to accompany the manuscript entitled:**

2 “A maternal “junk food” diet in pregnancy and lactation promotes an exacerbated taste for
3 “junk food” and a greater propensity for obesity in rat offspring” by Stéphanie A. Bayol,
4 Samantha J. Farrington & Neil C. Stickland.

5

6 **Summary of the article:**

7 We have examined the influence of a maternal junk food diet during pregnancy and lactation
8 on the feeding behaviour and growth in the offspring from weaning (21 days) up to 10 weeks
9 after birth. Results showed that 10 week old offspring exposed to a maternal junk food diet
10 during gestation and lactation exhibited hyperphagia and a preference for junk food rich in fat,
11 sugar and salt at the expense of protein-rich foods compared with offspring fed a balanced
12 chow diet before weaning or during lactation. This exacerbated hyperphagia was
13 accompanied by increased body weight and BMI. This supplementary information file
14 contains the ingredients and the nutritional information of the various foods used in the study
15 (supplementary table 1) and a graphic representation of the source of the energy consumed by
16 mothers fed the **junk food** diet during pregnancy and lactation (supplementary figure 1).
17 Supplementary figure 2 also illustrates the food preferences while supplementary figure 3
18 shows energy intake expressed per gram of body mass as well as feed efficiency.
19 **Supplementary tables 2, 3, 4 and 5 illustrate the body mass of dams and offspring in each**
20 **nutritional group at various stages of the study.**

21 **Supplementary table 1.** Nutritional information for 100g of each foodstuff used in the study,
 22 as supplied by the manufacturers.

23

	Energy kJ (kcal)	Proteins (g)	Carbo- hydrates (g)	Sucrose (g)	Total fat (g)	Satu- rated fat (g)	Sodium (g)	Dietary fibres (g)
Chow	1520.0 (363.3)	22.4	55.7	5.75	4.25	0.7	0.3	15.4
Biscuit	2081.5 (497.5)	6.0	66.4	20.2	23.1	9.5	0.7	3.3
Flapjack	1866.1 (446.0)	5.7	54.5	31.6	22.8	13.7	0.4	2.7
Cheese	1715.4 (410.0)	25.0	0.1	0.1	34.4	21.7	0.7	trace
Crisps	2330.5 (557.0)	4.5	4.8	0.8	38.0	13.0	0.5	3.5
Doughnut	1225.9 (293.0)	6.8	44.2	16.3	9.9	2.9	0.3	1.5
Muffin	1736.8 (415.1)	6.1	47.5	28.4	22.3	4.6	0.3	0.8
Chocolate	1878.6 (449.0)	4.2	69.0	63.8	17.4	10.6	0.1	trace
Marshmallow	1330.5 (318.0)	1.8	81.2	57.6	0.2	0.2	0.1	0.2

24

25

26 **List of ingredients for the various components of the diet as supplied by the**
27 **manufacturers:**

28 **RM3 chow** from SDS Ltd, UK (info@sds diets.com): wheat, wheatfeed, de-hulled extracted
29 toasted soya, barley, fish meal, whey powder, macro minerals, yeast, soya oil, vitamins, micro
30 minerals, amino acids.

31 **Biscuits:** wheat flour, vegetable and hydrogenated vegetable oil, wholemeal flour, sugar,
32 oatmeal flour, whey powder, partially inverted sugar syrup, sodium hydrogen carbonate,
33 ammonium hydrogen carbonate, salt.

34 **Flapjacks:** oats (38%), butter (24%), golden syrup (21%), sugar, skimmed milk powder, salt.

35 **Cheese:** pasteurized cultured milk, salt, enzymes.

36 **Potato crisps:** dehydrated potatoes, vegetable oil, corn flour, wheat starch, maltodextrin,
37 emulsifier: E471, salt, rice flour, dextrose.

38 **Jam doughnuts:** wheat flour, glucose-fructose syrup, raspberries, sugar, pectin, citric acid,
39 potassium sorbate, flavouring, sodium citrate, water, vegetable oil, yeast, dextrose, sugar, salt,
40 disodium diphosphate, sodium hydrogen carbonate, sodium stearyl-2-lactylate, mono-&-
41 diacetyl tartaric esters of mono-&- diglycerides of fatty acids, mono-&-diglycerides of fatty
42 acids, whole egg powder, full fat soya flour, hydroxypropyl methyl cellulose, ascorbic acid.

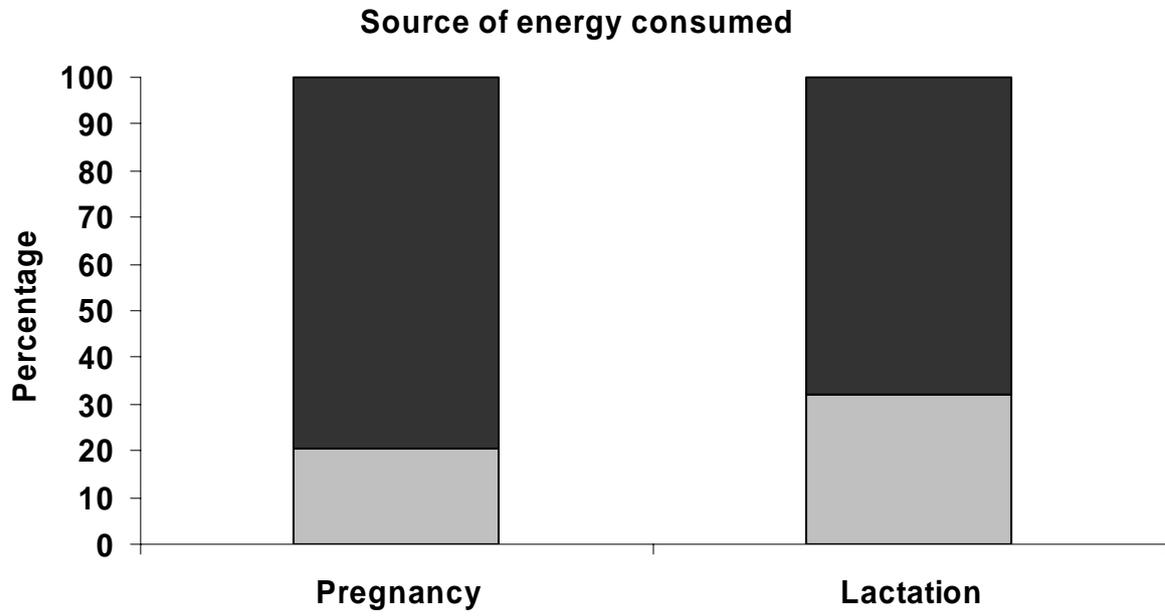
43 **Muffins:** wheat flour, sugar, pasteurised whole egg, vegetable & hydrogenated vegetable oil,
44 milk chocolate chips (11%) (sugar, full cream milk powder, cocoa butter, cocoa mass, whey
45 powder, skimmed milk powder, soya lecithin, flavouring), water, modified maize starch,
46 whey powder, raising agents: sodium hydrogen carbonate, sodium aluminium phosphate,
47 emulsifiers: mono- and diglycerides of fatty acids, propylene glycol esters of fatty acids, salt,
48 wheat gluten, xanthan gum, guar gum, flavouring.

49 **Chocolate:** sugar, glucose syrup, skimmed milk powder, vegetable fat, cocoa butter, cocoa
50 mass, lactose, milk fat, whey powder, fat reduced cocoa, malt extract, emulsifiers (E422, Soya

51 Lecithin), salt, egg white, hydrolysed milk protein, flavouring, (Traces: Peanut), milk
52 chocolate contains milk solids 14% minimum..
53 **Marshmallows:** sugar, glucose syrup, water, maize starch, beef gelatine, flavourings,
54 cochineal.
55

56 **Supplementary figure 1.** Source of energy consumed during pregnancy and lactation in rat
57 dams fed the junk food diet. Keys: energy from chow , energy from junk food .

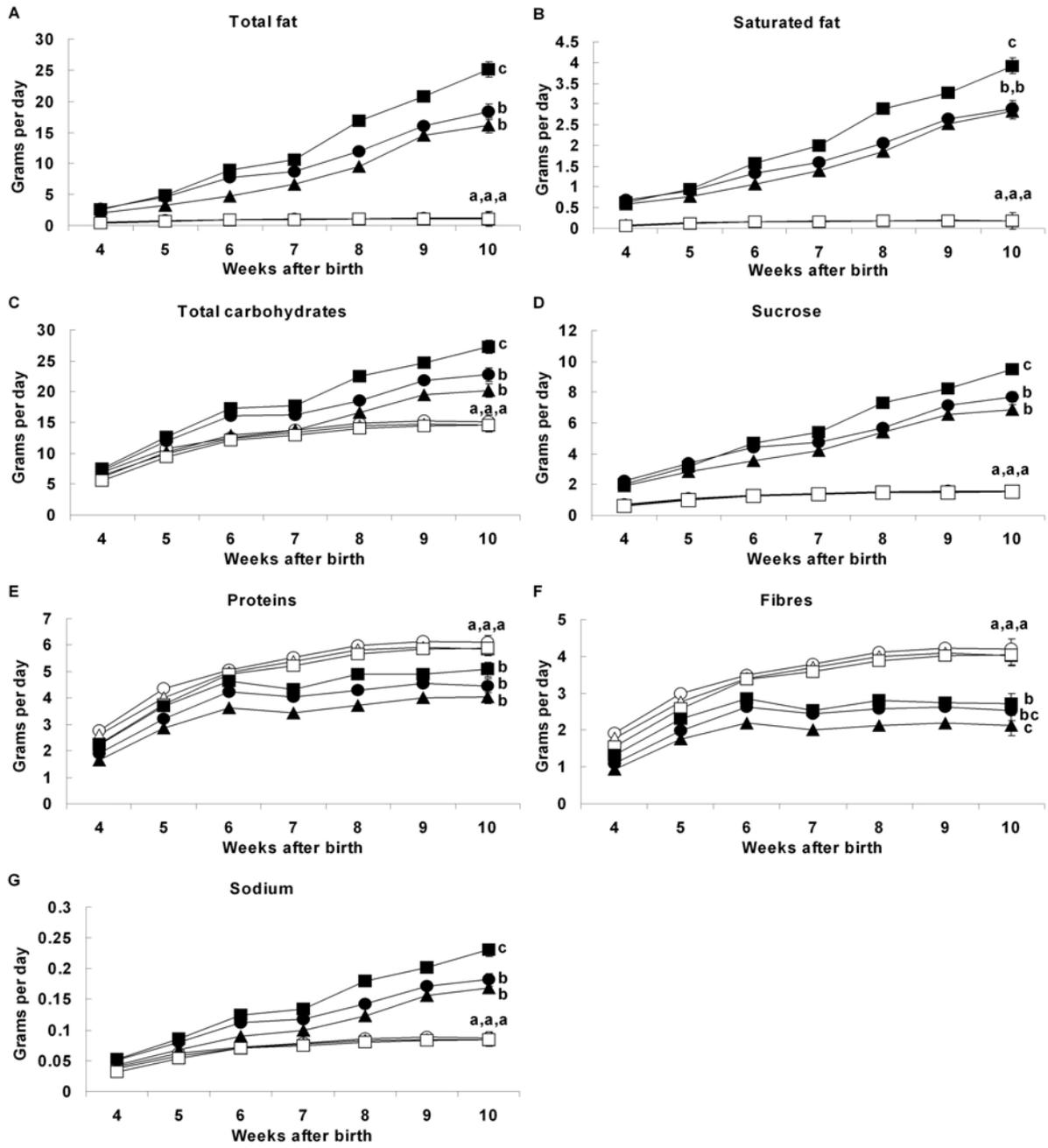
58



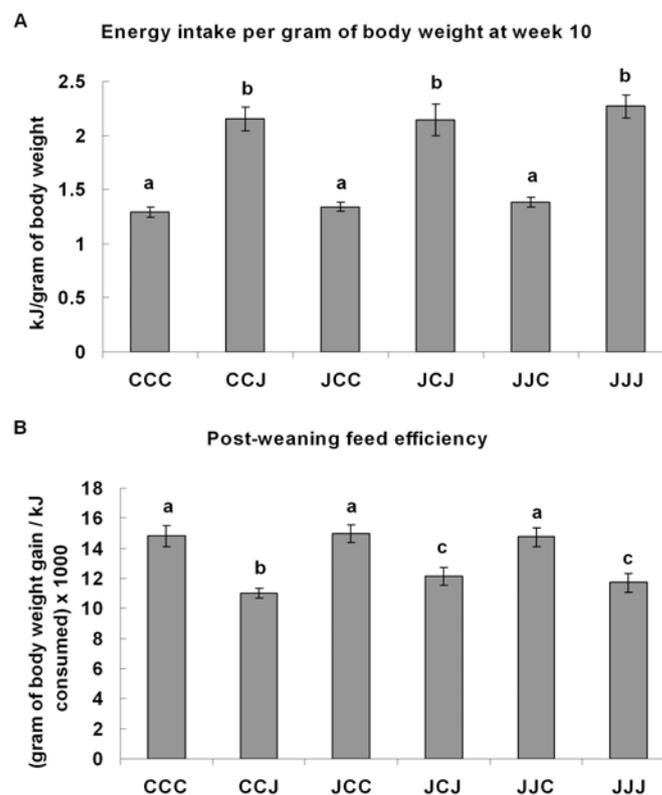
59

60

61 **Supplementary figure 2.** Average daily nutrient intake for post-natal weeks 4 to 10.
62 Offspring exposed to the junk food diet throughout the study (JJJ) exhibit an exacerbated
63 preference for fatty (A and B), sugary (C and D) and salty (C) foods at the expense of foods
64 rich in protein (E) and fibre (F). Keys: open symbols indicate animals weaned on chow alone
65 while filled symbols indicate those weaned on junk food, CCC = ○, CCJ = ●, JCC = Δ, JCJ =
66 ▲, JJC = □, JJJ = ■. Different letters at week 10 indicate statistical differences among the six
67 nutritional groups (P<0.05) by hierarchical 2-way ANOVA followed by Tukey HSD post hoc
68 analyses.



70 **Supplementary figure 3.** Energy intake per gram of body weight was increased in offspring
71 weaned on the junk food diet regardless of the maternal diet (A). Post-weaning feed efficiency
72 was higher in offspring weaned on chow alone; offspring fed chow alone before weaning
73 exhibited a reduced feed efficiency compared with other offspring weaned on the cafeteria
74 diet but which had also been exposed to this diet either throughout gestation and lactation or
75 gestation alone (B). Different letters indicate statistical differences among the six nutritional
76 groups ($P < 0.05$) by hierarchical 2-way ANOVA followed by Tukey HSD post hoc analyses.



77

78

79

80

81 **Supplementary table 2.** Body mass (grams) of dams at mating, at gestation day 20 (G20) and
82 at the end of lactation (L21). Keys: C: chow diet during gestation, J: junk food diet during
83 gestation, CC: chow diet during gestation and lactation, JC: junk food diet during gestation
84 and chow during lactation, JJ: junk food diet during gestation and lactation. Different letters
85 indicate statistical differences ($P < 0.05$) among nutritional groups for each stage.

86

Stage	Group	Mean	SEM
Mating	C	257.9	4.4
	J	262.5	3.4
G20	C	386.6a	5.4
	J	438.5b	5.2
L21	CC	360.4	5.8
	JC	363.9	5.7
	JJ	349.4	6.1

87

88

89 **Supplementary table 3.** Body mass (grams) of offspring at birth, at weaning and at post-natal
 90 week 10. Offspring were either fed chow alone (C) or with a junk food diet (J) during
 91 gestation, lactation and/or after weaning (see figure 1 for a detailed description of group
 92 names). Different letters indicate statistical differences ($P < 0.05$) among nutritional groups for
 93 each growth stage.

94

Growth stage	Sex	Group	Mean	SEM
Birth	Males & females	C	6.55a	0.06
		J	6.26b	0.03
Weaning	Males & females	CC	52.85a	0.40
		JC	43.92b	0.57
		JJ	49.39c	0.57
Post-natal week 10	Males	CCC	387.6ab	4.5
		CCJ	410.5b	8.7
		JCC	374.3a	7.5
		JCJ	366.4a	9.7
		JJC	368.8a	6.0
		JJJ	473.1c	14.8
		CCC	235.3a	5.8
	Females	CCJ	263.8b	6.7
		JCC	227.9a	4.2
		JCJ	253.4ab	5.5
		JJC	221.4a	3.8
		JJJ	310.7c	11.7

95

96 **Supplementary table 4.** Body mass (grams) of male offspring at post-natal weeks 4 to 10.
 97 Offspring were either fed chow alone (C) or with a junk food diet (J) during gestation,
 98 lactation and/or after weaning (see figure 1 for a detailed description of group names).
 99 Different letters indicate statistical differences among the six nutritional groups ($P < 0.05$) by
 100 one-way ANOVA and Games-Howell post hoc analyses for each growth stage.

101

Group	Week 4		Week 5		Week 6		Week 7		Week 8		Week 9		Week 10	
	Mean	SEM	Mean	SEM	Mean	SEM								
CCC	98.6	1.5	154.4	2.0	208.8	2.8	265.7	3.8	316.1	3.7	356.9	4.4	387.6	4.5
	a		a		a		ac		a		ab		ab	
CCJ	91.2	2.4	148.4	3.5	206.8	3.9	265.6	5.2	322.8	6.5	369.2	7.4	410.5	8.7
	ab		ac		a		ac		ac		b		b	
JCC	88.6	2.7	144.3	3.9	196.6	4.5	252.3	5.8	305.1	6.8	340.5	6.5	374.3	7.5
	b		abc		ab		abc		ab		a		a	
JCJ	74.3	2.7	127.2	4.7	179.6	6.3	231.7	7.0	284.3	8.0	330.2	8.9	366.4	9.7
	c		ac		b		b		b		a		a	
JJC	88.3	1.7	143.4	2.2	197.3	2.9	252.0	3.6	304.2	4.4	342.4	5.1	368.8	6.0
	b		b		ab		ab		ab		ab		a	
JJJ	92.2	3.8	154.9	6.4	218.9	7.8	285.3	9.8	358.0	12.0	418.5	13.3	473.1	14.8
	ab		c		a		c		c		c		c	

102

103 **Supplementary table 5.** Body mass (grams) of female offspring at post-natal weeks 4 to 10.
 104 Offspring were either fed chow alone (C) or with a junk food diet (J) during gestation,
 105 lactation and/or after weaning (see figure 1 for a detailed description of group names).
 106 Different letters indicate statistical differences among the six nutritional groups ($P < 0.05$) by
 107 one-way ANOVA and Games-Howell post hoc analyses for each growth stage.
 108

Group	Week 4		Week 5		Week 6		Week 7		Week 8		Week 9		Week 10	
	Mean	SEM	Mean	SEM										
CCC	93.2	1.9	134.1	2.1	161.7	2.8	182.8	3.2	203.3	3.6	221.3	4.6	235.3	5.8
	a		a		abc		abc		ab		acd		a	
CCJ	83.8	2.5	127.6	3.0	165.2	3.5	193.7	4.7	221.7	5.7	249.3	7.8	263.8	6.7
	b		ab		ac		acd		bc		bce		b	
JCC	82.6	1.5	124.7	2.0	154.3	2.4	176.5	2.7	197.4	3.3	212.4	3.2	227.9	4.2
	b		bd		ab		bc		a		ad		a	
JCJ	69.7	2.4	114.4	2.8	150.9	3.1	177.6	3.0	201.4	4.9	233.3	5.2	253.4	5.5
	c		c		b		c		ab		c		ab	
JJC	78.8	1.6	121.1	1.9	152.1	1.9	174.3	2.4	192.8	3.2	209.1	3.1	221.4	3.8
	b		cd		b		b		a		d		a	
JJJ	85.4	3.6	135.1	5.2	175.6	6.0	207.7	7.1	239.1	8.3	278.9	10.0	310.7	11.7
	ab		abd		c		d		c		e		c	

109