Supplemental Table 1. Specific food items included in the analysis of meat groups

Meat group	Type of meat
Unprocessed red meat	Beef, pork, lamb
Processed red meat	Hamburguer, sausages, bacon, other processed meats (e,g, ham, mortadella, salami), pate, foie-gras.
Organs	Beef, calf, pork, chicken, turkey liver, and other organs (e,g, brains, sweetbread).
White meat	Chicken with and without skin, rabbit, quail, duck.
White fish meat	Hake, golden, sole.
Dark fish meat	Salmon, anchovies, tuna, emperor, bonito, sardines, mackerel.
Shellfish	Clams, mussels, oysters, squid, cuttlefish, octopus, prawns, crabs, lobsters.

Supplemental Table 2. Dietary patterns identified by using principal components analysis and their food group components without Total Meat intake*. Murcia Young Men's Study (n=206)

Food group[a]	Mediterranean[b]	Western[b]
Other vegetables	0.76	
Tomatoes	0.70	
Leafy green vegetables	0.65	
Dark yellow vegetables	0.63	
Cruciferous vegetables	0.59	
Fruit	0.49	
Tea	0.44	0.27
Legumes	0.43	
Soups	0.43	
Potatoes	0.38	0.20
Garlic	0.35	
Olive oil	0.32	0.25
Coffee	0.30	
Eggs	0.29	
Wine	0.28	0.22
Low fat dairy	0.26	
French chips		0.52
Sweets		0.50
Refined grains	0.20	0.50
Snacks		0.49
Butter		0.46
Pizza		0.42
Fruit juices		0.41
Other oils		0.38
Nuts	0.33	0.36
Condiments		0.36
High fat dairy		0.35
Olives	0.21	0.32
Margarine		0.30
Mayonnaise		0.28
Beer		0.21
Variance explained (%)	11.95	7.54

*Total Meat intake: Processed meats, Red meats, Organ meats, Fish and other seafood, Poultry

[a]Whole grains, low energy drinks, high energy drinks and liquor were not included in the table because the loading factors were $\leq |0.2|$ for both dietary patterns.

[b]Principal component analysis was used as an extraction method in which the factor loading of a food group represents the contribution of that food group to the factor identified

Supplemental Table 3. Participant characteristics according to intakes of quartiles of total meat[a]. Murcia Young Men's Study (n=206)

	Total cohort (n = 206)		**Q1 (n = 53) (lowest)**		**Q2 (n = 51)**		**Q3 (n = 51)**		**Q4 (n = 51) (highest)**		***P*‡**
Range, servings/day	0 – 9.12		0 – 1.78		1.79 – 2.38		2.39 – 3.23		3.24 – 9.12		
Age (years)	20.5	(19.6-21.5)	20.6	(19.8-21.4)	20.5	(19.4-21.5)	20.0	(19.6-21.2)	20.8	(19.9-21.8)	0.30
Caucasian	201	(97.6)	51	(96.2)	50	(98.0)	50	(98.0)	50	(98.0)	0.82
Body mass index (Kg/m^2)	23.7	(21.8-25.4)	24.0	(22.1-25.6)	23.2	(21.3-25.6)	23.5	(21.7-24.9)	23.6	(22.0-25.6)	0.73
Smoking	65	(31.9)	19	(35.8)	14	(28.0)	17	(34.0)	15	(29.4)	0.81
Testicular volume (ml)	21.0	(19.5-24.0)	21.0	(19.0-24.5)	21.0	(20.0-23.0)	22.0	(20.0-24.0)	21.0	(19.0-24.0)	0.88
History of cryptorchidism	4	(1.9)	1	(1.9)	1	(2.0)	1	(2.0)	1	(2.0)	0.48
Varicocele, n (%)	14	(6.8)	6	(11.3)	2	(3.9)	4	(7.8)	2	(3.9)	0.52
Inguinal hernia repair[b]	7	(3.4)	1	(1.9)	3	(5.9)	0	(0)	3	(5.9)	0.25
Surgical scar[b]	71	(34.5)	19	(35.8)	16	(31.4)	16	(31.4)	20	(39.2)	0.84
Use of hormones[c]	1	(0.5)	1	(2.0)	0	(0)	0	(0)	0	(0)	0.40
Use of dietary supplements[d]	29	(14.1)	6	(11.3)	12	(23.5)	5	(9.8)	6	(11.8)	0.82
Calories intake (kcal/day)	2281.0	(1894.4-2928.6)	1775.4	(1493.2-2196.5)	2092.3	(1811.0-2286.4)	2548.1	(2237.1-2935.9)	3044.3	(2597.9-3612.8)	<0.001
Physical activity (h/week)	9.0	(6.0-13.0)	7.0	(5.0-10.0)	8.0	(5.0-14.0)	9.0	(6.0-13.0)	10.0	(6.0-15.0)	0.05
TV watching (h/week)	20.0	(14.0-41.0)	29.0	(20.0-52.0)	20.0	(14.0-35.0)	20.0	(14.0-35.0)	20.0	(14.0-41.0)	0.05
Abstinence time (h)	71.0	(59.8-92.0)	72.0	(63.5-91.5)	72.0	(60.0-93.0)	72.0	(55.0-90.0)	70.0	(55.0-94.0)	0.99
Time to semen analysis (min)	35.0	(30.0-45.0)	30.0	(30.0-42.5)	40.0	(30.0-45.0)	40.0	(30.0-45.0)	40.0	(30.0-45.0)	0.19
Time of blood draw (min)	245.0	(112.5-270.0)	250.0	(135.0-295.0)	260.0	(120.0-270.0)	235.0	(85.0-270.0)	245.0	(125.0-270.0)	0.46
Mediterranean diet pattern score[e]	-0.2	(-0.7 to 0.4)	-0.5	(-1.0 to 0.0)	-0.1	(-0.7 to 0.3)	-0.3	(-0.7 to 0.3)	0.3	(-0.3 to 1.2)	<0.001
Western diet pattern score[e]	-0.2	(-0.7 to 0.5)	-0.5	(-0.8 to 0.4)	-0.3	(-0.8 to 0.0)	0.1	(-0.4 to 0.7)	0.1	(-0.5 to 1.0)	0.01
Semen volume (ml)	3.0	(2.0-4.0)	3.1	(2.3-3.7)	3.0	(1.9-4.1)	3.1	(2.0-4.5)	2.9	(2.0-3.7)	0.75
Sperm concentration (millions/ml)	43.4	(21.9-72.3)	42.4	(27.5-73.6)	44.9	(22.0-72.0)	38.8	(18.2-72.3)	47.5	(18.7-72.7)	0.94
Total sperm count (millions)	120.1	(63.3-212.5)	129.5	(71.8-212.5)	112.9	(51.9-235.8)	106.3	(72.6-183.5)	117.2	(56.3-196.2)	0.97
Sperm motility (%)	57.1	(50.7-63.8)	57.6	(50.3-62.5)	58.8	(50.0-66.1)	56.8	(49.0-62.0)	56.2	(51.5-65.2)	0.71
Progressive motility (%)	48.3	(41.3-55.2)	48.0	(40.3-54.4)	48.7	(42.2-56.0)	49.7	(41.0-55.3)	46.1	(39.3-56.7)	0.81
Morphologically normal sperm (%)	9.0	(6.0-14.0)	9.0	(6.0-14.7)	10.0	(6.0-14.0)	8.0	(5.0-16.0)	9.0	(5.7-14.0)	0.88
Luteinizing hormone (IU/L)	4.0	(2.8-5.3)	3.9	(2.7-5.7)	3.6	(2.9-4.9)	4.4	(3.6-5.8)	4.3	(2.8-5.2)	0.26
Follicle-stimulating hormone (IU/L)	2.2	(1.6-3.3)	2.2	(1.5-3.2)	2.3	(1.7-3.8)	2.1	(1.6-3.5)	2.2	(1.5-3.3)	0.91
Estradiol (pmol/L)	76.0	(63.0-91.2)	72.0	(59.5-83.0)	77.0	(65.0-92.0)	76.0	(63.0-98.0)	76.0	(61.0-96.0)	0.28
Calculated free testosterone (nmol/L)	13.4	(10.7-17.1)	13.6	(9.8-16.0)	13.1	(10.5-16.1)	15.0	(11.5-17.4)	13.7	(10.3-18.1)	0.33
Total testosterone (nmol/L)	21.2	(17.1-26.6)	20.4	(16.5-27.1)	21.2	(17.1-26.2)	21.9	(18.4-26.6)	20.1	(16.3-26.8)	0.55
Inhibin B (pg/mL)	193.0	(147.0-246.0)	204.0	(148.5-246.0)	177.0	(142.0-234.0)	196.0	(145.0-265.0)	193.0	(148.0-237.0)	0.60
Sex hormone-binding globulin (nmol/L)	30.0	(23.0-39.0)	29.0	(20.5-40.5)	34.0	(22.0-40.0)	32.0	(23.0-38.0)	29.0	(24.0-36.0)	0.80

Continuous variables are shown as median and interquartile range unless otherwise indicated.

[a]Total intake of red meats, processed meats, organ meats, white meats, fish meats. [b]Physical examination in the genital area (including lower abdomen)

[c]Self-report of any use of dehydroepiandrostendione, androstenedione, creatinine, steroids or other muscle buildings; [d]Vitamins and minerals; [e]Dietary pattern scores without total meat intake

‡Kruskal-Wallis test for continuous variables and χ^2 test for categorical variables

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Supplemental Table 4. Associations of meat intake with semen parameters (raw data). Murcia Young Men's Study (n=206)

Meat intake (servings/day); range		**Volume***		**Sperm concentration***		**Total sperm count***		**Motile sperm**		**Progressive motility**		**Morphologically normal sperm***	
	n	ml	95% CI	10^6/ml	95% CI	10^6	95% CI	%	95% CI	%	95% CI	%	95% CI
Total meat intake													
Q1 (0-1.78)	53	2.8	2.3-3.3	37.7	28.9-49.2	104.2	77.8-139.4	56.3	53.5-59.2	47.7	44.7-50.7	8.6	7.3-10.3
Q2 (>1.78-2.38)	51	2.6	2.2-3.1	39.9	30.4-52.3	103.7	76.8-139.9	57.9	55.0-60.8	49.0	45.9-52.0	8.8	7.4-10.5
Q3 (>2.38-3.23)	51	3.1	2.6-3.6	36.9	28.1-48.4	112.8	83.8-151.8	55.7	52.8-58.6	47.8	44.8-50.8	8.1	6.8-9.7
Q4 (>3.23-9.12)	51	2.7	2.3-3.3	34.7	26.5-45.5	94.9	70.5-127.8	57.1	54.2-60.1	47.1	44.0-50.1	8.9	7.4-10.6
P_{trend}		0.74		0.59		0.77		0.98		0.66		1.00	
Total red meat intake[a]													
Q1 (0-0.72)	52	2.9	2.5-3.5	39.3	30.1-51.4	114.4	85.0-153.9	56.0	53.2-58.9	47.2	44.2-50.1	8.1	6.8-9.6
Q2 (>0.72-1.01)	53	2.8	2.4-3.3	37.8	29.0-49.2	106.2	79.4-142.1	55.4	52.6-58.2	46.2	43.2-49.1	8.9	7.5-10.6
Q3 (>1.01-1.42)	50	2.7	2.2-3.2	37.6	28.6-49.4	100.2	74.3-135.3	58.5	55.6-61.4	50.6	47.6-53.6	9.3	7.7-11.1
Q4 (>1.42-4.25)	51	2.8	2.3-3.3	34.5	26.3-45.2	94.8	70.5-127.6	57.2	54.3-60.2	47.8	44.7-50.8	8.2	6.9-9.8
P_{trend}		0.53		0.51		0.36		0.30		0.36		0.85	
Total white meat intake[b]													
Q1 (0-0.21)	58	2.8	2.4-3.3	38.2	29.7-49.3	106.5	80.6-140.5	56.3	53.6-59.0	48.3	45.5-51.2	9.7	8.2-11.5
Q2 (>0.21-0.35)	43	2.7	2.3-3.3	31.7	23.6-42.6	87.2	63.2-120.4	57.5	54.3-60.6	49.0	45.7-52.3	7.7	6.4-9.4
Q3 (>0.35-0.57)	62	3.0	2.6-3.5	38.6	30.2-49.3	114.9	87.7-150.7	56.0	53.4-58.6	47.1	44.3-49.8	9.1	7.8-10.6
Q4 (>0.57-2.57)	43	2.6	2.1-3.1	40.2	30.0-53.9	102.9	74.5-142.1	57.8	54.6-61.0	47.3	44.0-50.6	7.5	6.2-9.1
P_{trend}		0.78		0.65		0.81		0.69		0.48		0.13	
Total fish meat intake													
Q1 (0-0.53)	53	2.7	2.3-3.2	40.1	30.8-52.2	107.0	80.1-143.0	57.5	54.7-60.4	48.9	45.9-51.8	8.5	7.1-10.1
Q2 (>0.53-0.77)	53	2.5	2.1-2.9	34.3	26.3-44.7	84.4	63.2-112.8	56.0	53.2-58.8	46.9	44.0-49.9	8.6	7.3-10.3
Q3 (>0.77-1.24)	50	3.3	2.8-4.0	34.1	25.9-44.8	112.1	83.0-151.6	57.8	54.8-60.7	50.2	47.1-53.3	8.3	6.9-9.9
Q4 (>1.24-4.66)	50	2.8	2.4-3.3	41.1	31.3-54.0	115.5	85.7-155.7	55.7	52.8-58.7	45.6	42.6-48.6	9.0	7.5-10.7
P_{trend}		0.24		0.92		0.45		0.58		0.34		0.75	

CI, confidence interval

[a]Includes processed and unprocessed red meat, and organ meat

[b]Includes chicken with and without skin, rabbit, quail and duck

*Back-transformed to original scale

Supplemental Table 5. Associations of meat intake with reproductive hormones (raw data). Murcia Young Men's Study (n=206)

Meat intake (servings/day); range		LH		FSH*		Estradiol*		Free Testosterone		Total Testosterone		Inhibin B		SHBG	
	n	IU/L	95% CI	IU/L	95% CI	pmol/L	95% CI	nmol/L	95% CI	nmol/L	95% CI	pg/mL	95% CI	nmol/L	95% CI
Total meat intake															
Q1 (0-1.78)	53	4.4	3.9-4.8	2.3	2-2.7	70.8	65.5-76.5	14.1	12.8-15.4	21.4	19.5-23.3	208.7	187.4-229.9	30.8	27.6-34.0
Q2 (>1.78-2.38)	51	3.9	3.4-4.4	2.3	2-2.7	76.5	70.7-82.8	13.5	12.2-14.8	21.4	19.5-23.3	196.8	175.2-218.4	33.4	30.1-36.6
Q3 (>2.38-3.23)	51	4.5	4.1-5	2.2	1.9-2.6	79.2	73.2-85.7	15.1	13.8-16.5	23.1	21.2-25.1	209.6	188-231.3	31.8	28.6-35.1
Q4 (>3.23-9.12)	51	4.1	3.6-4.6	2.3	2-2.7	76.8	71.0-83.1	14.3	12.9-15.7	21.6	19.7-23.5	194.8	173.2-216.4	30.4	27.2-33.7
P_{trend}		0.88		0.89		0.11		0.45		0.57		0.55		0.74	
Total red meat intake[a]															
Q1 (0-0.72)	52	4.1	3.7-4.6	2.2	1.9-2.6	72.3	66.9-78.0	14.2	12.8-15.5	22.0	20.2-23.9	202.5	181.2-223.8	32.7	29.5-35.9
Q2 (>0.72-1.01)	53	4.1	3.6-4.6	2.2	1.9-2.6	76.5	70.9-82.5	14.6	13.3-15.9	22.3	20.4-24.1	210	188.9-231.2	31.4	28.2-34.6
Q3 (>1.01-1.42)	50	4.4	3.9-4.8	2.3	1.9-2.6	71.3	65.9-77.1	12.8	11.4-14.1	20.0	18.1-21.9	210	188.2-231.8	32.1	28.8-35.4
Q4 (>1.42-4.25)	51	4.3	3.9-4.8	2.5	2.1-2.9	83.4	77.2-90.2‡	15.5	14.2-16.8	23.2	21.3-25.1	187.4	165.9-209	30.1	26.9-33.4
P_{trend}		0.41		0.38		0.04		0.48		0.80		0.35		0.34	
Total white meat intake[db]															
Q1 (0-0.21)	58	4.2	3.8-4.7	2.4	2.1-2.8	70.7	65.7-76.0	13.6	12.3-14.9	21.2	19.4-23.0	217.3	197.1-237.4	32.2	29.1-35.3
Q2 (>0.21-0.35)	43	4.4	3.9-4.9	2.4	2.1-2.9	75.1	69-81.7	14.2	12.7-15.6	21.7	19.6-23.8	196.7	173.3-220.1	31.1	27.5-34.6
Q3 (>0.35-0.57)	62	4.2	3.8-4.7	2.2	1.9-2.5	75.6	70.5-81.1	14.7	13.4-15.9	22.2	20.5-23.9	190.1	170.6-209.6	31.4	28.5-34.4
Q4 (>0.57-2.57)	43	4.1	3.5-4.6	2.2	1.9-2.6	84.0	77.2-91.5‡	14.7	13.2-16.2	22.5	20.4-24.7	206.4	183-229.8	31.4	27.9-35.0
P_{trend}		0.59		0.29		<0.01		0.21		0.30		0.30		0.76	
Total fish meat intake															
Q1 (0-0.53)	53	4.3	3.8-4.7	2.1	1.8-2.5	73.0	67.6-78.9	14.2	12.8-15.5	21.3	19.4-23.2	207.4	186.4-228.4	30.5	27.3-33.7
Q2 (>0.53-0.77)	53	4.5	4-4.9	2.7	2.3-3.1	77.7	71.9-84.0	14.0	12.7-15.4	22.5	20.7-24.4	181.1	160.1-202.1	34.5	31.3-37.7
Q3 (>0.77-1.24)	50	4.3	3.8-4.7	2.4	2.1-2.8	74.7	69.0-81.0	14.0	12.6-15.4	21.2	19.3-23.1	213.1	191.5-234.7	30.4	27.1-33.7
Q4 (>1.24-4.66)	50	3.9	3.4-4.4	2.0	1.7-2.3	77.6	71.6-84.0	14.9	13.5-16.3	22.5	20.5-24.5	209.6	188-231.2	30.8	27.5-34.1
P_{trend}		0.23		0.41		0.43		0.49		0.59		0.44		0.67	

CI, confidence interval;; LH, luteinizing hormone; FSH, follicle-stimulating hormone; SHBG, sex hormone-binding globulin

[a]Includes processed and unprocessed red meat, and organ meat [b]Includes chicken with and without skin, rabbit, quail and duck

*Back-transformed to original scale; ‡Significantly different to mean in the lowest quartile of intake at 0.05

Supplemental Table 6. Meat intake and semen quality by subgroupings of meat categories (raw data). Murcia Young Men's Study (n=206)

Meat intake (servings/day); range		**Volume***		**Sperm concentration***		**Total sperm count***		**Motile sperm**		**Progressive motility**		**Morphologically normal sperm***	
	n	ml	95% CI	10^6/ml	95% CI	10^6	95% CI	10^6	95% CI	10^6	95% CI	%	95% CI
Processed red meat intake[a]													
T1 (0-0.50)	70	2.8	2.4-3.3	37.6	29.9-47.3	104.6	81.1-134.9	56.0	53.5-58.4	47.4	44.8-50.0	8.4	7.2-9.8
T2 (>0.50-0.80)	66	2.8	2.4-3.3	40.8	32.2-51.7	115.5	89.1-149.8	55.3	52.8-57.8	46.4	43.8-49.1	9.1	7.8-10.6
T3 (>0.80-3.75)	70	2.7	2.4-3.2	33.9	26.9-42.7	92.9	72.1-119.5	59.0	56.5-61.4	49.8	47.2-52.3	8.4	7.2-9.7
P_{trend}		0.83		0.53		0.51		0.09		0.21		0.98	
Unprocessed red meat intake[b]													
Low (0-0.14)	106	3.0	2.6-3.3	41.0	34.1-49.4	121.1	98.7-148.5	57.0	55.0-59.0	48.6	46.5-50.7	9.0	7.9-10.1
High (>0.14-2.50)	100	2.6	2.3-3.0	33.6	27.8-40.7	88.1	71.5-108.6‡	56.5	54.4-58.6	47.1	45.0-49.3	8.2	7.3-9.3
P_{trend}		0.16		0.14		0.03		0.72		0.35		0.34	
Organ meat intake[c]													
None (0)	124	2.8	2.5-3.1	39.0	32.8-46.3	108.1	89.3-130.7	58.1	56.2-59.9	49.4	47.5-51.3	8.6	7.6-9.6
Any (>0-0.79)	82	2.8	2.4-3.2	34.8	28.2-43.1	97.5	77.2-123.1	54.7	52.5-57.0‡	45.6	43.2-47.9‡	8.7	7.5-10.0
P_{trend}		0.95		0.42		0.50		0.02		0.01		0.89	
White fish meat intake[d]													
Q1 (0-0.13)	68	2.9	2.5-3.4	39.5	31.3-49.7	115.0	89.6-147.7	57.7	55.2-60.2	49.2	46.6-51.8	8.4	7.2-9.8
Q2 (>0.13-0.21)	52	2.9	2.4-3.4	31.6	24.2-41.1	90.4	67.7-120.6	55.6	52.7-58.4	46.9	43.9-49.9	8.3	7.0-9.9
Q3 (>0.21-0.29)	36	2.1	1.7-2.6	31.1	22.6-42.8	66.6	47.2-93.9	57.4	53.9-60.8	48.7	45.1-52.4	9.4	7.6-11.7
Q4 (>0.29-1.22)	50	3.1	2.6-3.6	46.7	35.6-61.1	142.6	106.6-190.9	56.2	53.3-59.2	46.6	43.6-49.7	8.7	7.3-10.3
P-trend		0.75		0.46		0.62		0.59		0.31		0.62	
Dark fish meat intake[e]													
Q1 (0-0.26)	54	2.6	2.2-3.1	43.0	33.1-55.9	112.7	84.6-150.2	57.7	54.9-60.5	49.1	46.2-52	8.6	7.3-10.3
Q2 (>0.26-0.40)	48	2.4	2.0-2.8	34.6	26.2-45.7	82.3	60.7-111.6	56.1	53.2-59.1	47.1	44-50.2	9.3	7.8-11.2
Q3 (>0.40-0.71)	52	3.3	2.8-3.9	34.1	26.1-44.6	110.6	82.3-148.6	57.3	54.4-60.2	49.1	46-52.1	7.6	6.4-9.1
Q4 (>0.71-2.57)	52	2.9	2.5-3.5	37.6	28.8-49.1	110.5	82.5-148.0	55.8	52.9-58.7	46.2	43.2-49.2	8.9	7.5-10.6
P-trend		0.09		0.48		0.76		0.47		0.31		0.8	
Shellfish intake[f]													
Q1 (0-0.04)	52	3.1	2.6-3.6	38.4	29.3-50.2	117.8	88.0-157.6	55.7	52.9-58.5	46.8	43.9-49.7	8.8	7.4-10.4
Q2 (>0.04-0.12)	33	2.2	1.8-2.7	33.2	23.7-46.5	72.6	50.3-104.6	52.7	49.2-56.2	43.0	39.3-46.6	7.3	5.9-9.1
Q3 (>0.12-0.14)	70	2.9	2.5-3.3	39.2	31.1-49.4	111.9	87.1-143.8	58.1	55.7-60.6	48.9	46.4-51.4	9.0	7.8-10.5
Q4 (>0.14-1.23)	51	2.9	2.4-3.4	36.3	27.7-47.6	103.4	76.9-139.2	58.6	55.7-61.5	50.8	47.9-53.8	8.8	7.4-10.5
P-trend		0.97		0.97		0.93		0.05		0.02		0.66	

CI, confidence interval

[a]includes hamburguer, sausages, bacon, other processed meats (e,g, ham, mortadella, salami), and pate and foie-gras; [b]includes beef, pork, lamb

[c]includes beef, calf, pork, chicken, turkey liver, and other organs (e,g, brains, sweetbread)

[d]includes hake, golden, sole (boiled, grilled or fried)

[e]includes salmon, anchovies, tuna, emperor, bonito, sardines, mackerel (boiled, grilled, canned, salted, smoked);

[f]includes clams, mussels, oysters, squid, cuttlefish, octopus, prawns, crabs, lobsters

*Back-transformed to original scale

‡Significantly different to mean in the lowest quartile of intake at 0.05

Supplemental Table 7. Meat intake and reproductive hormones by subgroupings of meat categories (raw data). Murcia Young Men's Study (n=206)

Meat intake (servings/day); range		LH		FSH*		Estradiol*		Free Testosterone		Total Testosterone		Inhibin B		SHBG	
	n	ml	95% CI	10^6/ml	95% CI	106	95% CI	%	95% CI	%	95% CI	%	95% CI	%	95% CI
Processed red meat intake[a]															
T1 (0-0.50)	70	4.3	3.9-4.7	2.3	2.0-2.6	74.7	69.9-79.8	14.2	13.1-15.4	22.5	20.8-24.1	201.5	183.2-219.8	33.4	30.7-36.2
T2 (>0.50-0.80)	66	4.1	3.7-4.5	2.2	1.9-2.5	71.3	66.6-76.3	13.8	12.6-15.0	20.7	19.0-22.3	215.6	196.7-234.5	29.9	27.1-32.7
T3 (>0.80-3.75)	70	4.3	3.9-4.7	2.4	2.1-2.7	81.3	76.0-86.9	14.7	13.6-15.9	22.5	20.8-24.1	191.2	172.9-209.6	31.3	28.6-34.1
P_{trend}		0.83		0.7		0.08		0.55		0.99		0.44		0.29	
Unprocessed red meat intake[b]															
Low (0-0.14)	106	4.0	3.6-4.3	2.2	2.0-2.5	72.0	68.2-76.0	14.1	13.2-15.1	20.9	19.6-22.3	207.2	192.2-222.1	29.3	27.1-31.5
High (>0.14-2.50)	100	4.5	4.2-4.9‡	2.4	2.1-2.6	79.9	75.5-84.4‡	14.4	13.4-15.4	22.9	21.5-24.2‡	197.6	182.2-213.0	34.0	31.7-36.2‡
P_{trend}		0.01		0.45		0.01		0.68		0.04		0.38		0.004	
Organ meat intake[c]															
None (0)	124	4.0	3.7-4.3	2.4	2.1-2.6	75.2	71.4-79.1	13.7	12.9-14.6	21.2	20.0-22.4	199.6	185.8-213.5	31.7	29.6-33.7
Any (>0-0.79)	82	4.5	4.2-4.9	2.2	2.0-2.5	76.6	71.9-81.5	15.1	14.0-16.1	22.9	21.4-24.4	206.9	189.9-223.9	31.5	28.9-34.0
P_{trend}		0.88		0.13		0.32		0.21		0.91		0.88		0.01	
White fish meat intake[d]															
Q1 (0-0.13)	68	4.2	3.7-4.6	2.1	1.8-2.4	75.4	70.4-80.7	14.3	13.1-15.5	21.8	20.1-23.4	212.2	193.6-230.9	31.7	28.9-34.5
Q2 (>0.13-0.21)	52	4.4	4.0-4.9	2.8	2.4-3.2	71.6	66.2-77.5	13.3	11.9-14.6	21.8	19.9-23.7	204.2	182.9-225.5	34.9	31.7-38.1
Q3 (>0.21-0.29)	36	4.5	3.9-5.0	2.2	1.8-2.6	79.0	71.9-86.8	14.5	12.8-16.1	21.7	19.4-24.0	181.4	155.8-207.0	29.5	25.7-33.3
Q4 (>0.29-1.22)	50	4.0	3.5-4.4	2.2	1.9-2.6	78.3	72.3-84.8	15.1	13.7-16.4	22.2	20.3-24.1	202.8	181.1-224.5	29.4	26.2-32.7
P_{trend}		0.64		0.95		0.28		0.29		0.77		0.29		0.13	
Dark fish meat intake[e]															
Q1 (0-0.26)	54	4.2	3.8-4.7	2.1	1.9-2.5	73.0	67.6-78.8	14.1	12.8-15.4	20.9	19.1-22.8	203.8	182.9-224.6	29.3	26.1-32.4
Q2 (>0.26-0.40)	48	4.5	4.0-5.0	2.6	2.2-3.0	75.3	69.4-81.7	14.5	13.1-15.9	22.5	20.6-24.5	195.2	173.1-217.3	33.0	29.7-36.3
Q3 (>0.40-0.71)	52	4.3	3.8-4.7	2.6	2.3-3.0	75.9	70.2-82.1	13.7	12.3-15.0	21.7	19.8-23.6	189.0	167.8-210.2	33.2	30.0-36.4
Q4 (>0.71-2.57)	52	4.0	3.5-4.4	1.9	1.7-2.3	78.9	72.9-85.3	14.8	13.5-16.1	22.5	20.6-24.4	221.5	200.3-242.7	31	27.8-34.2
P_{trend}		0.34		0.43		0.17		0.67		0.37		0.34		0.42	
Shellfish intake[f]															
Q1 (0-0.04)	52	4.3	3.8-4.7	2.3	2.0-2.6	75.6	70.0-81.7	14.3	13.0-15.7	22.0	20.1-23.9	187.7	166.5-209.0	31.4	28.2-34.7
Q2 (>0.04-0.12)	33	4.2	3.6-4.8	2.0	1.7-2.4	84.1	76.3-92.7	14.1	12.4-15.9	21.8	19.4-24.2	191.9	165.2-218.6	31.2	27.2-35.2
Q3 (>0.12-0.14)	70	4.4	4.0-4.8	2.3	2.0-2.7	75.7	70.8-81.0	14.7	13.6-15.9	22.9	21.2-24.5	212.4	194.1-230.7	33.2	30.4-36.0
Q4 (>0.14-1.23)	51	4.0	3.6-4.5	2.5	2.1-2.9	70.8	65.5-76.6	13.6	12.3-15.0	20.4	18.5-22.3	210.9	189.4-232.4	29.7	26.5-33.0
P_{trend}		0.68		0.30		0.14		0.66		0.43		0.06		0.72	

LH, luteinizing hormone; FSH, follicle-stimulating hormone; SHBG, sex hormone-binding globulin; CI, confidence interval

[a]includes hamburguer, sausages, bacon, other processed meats (e,g, ham, mortadella, salami), and pate and foie-gras; [b]includes beef, pork, lamb; [c]includes beef, calf, pork, chicken, turkey liver, and other organs (e,g, brains, sweetbread); [d]includes hake, golden, sole (boiled, grilled or fried); [e]includes salmon, anchovies, tuna, emperor, bonito, sardines, mackerel (boiled, grilled, canned, salted, smoked); [f]includes clams, mussels, oysters, squid, cuttlefish, octopus, prawns, crabs, lobsters

*Back-transformed to original scale

‡Significantly different to mean in the lowest quartile of intake at 0.05

Supplemental Table 8. Multivariable adjusted[a] semen parameters (95% Confidence interval) in relation to subgroups of meat categories. Murcia Young Men's Study (n=206)

Meat intake (servings/day); range		Volume*		Sperm concentration*		Total sperm count*		Motile sperm[b]		Progressive motility[b]		Morphologically normal sperm*	
	n	ml	95% CI	10^6/ml	95% CI	10^6	95% CI	10^6	95% CI	10^6	95% CI	%	95% CI
Processed red meat intake[c]													
T1 (0-0.50)	70	2.7	2.3-3.2	35.1	27.3-45.1	95.6	72.2-126.5	55.8	53.2-58.3	46.9	44.3-49.6	8.3	7.0-9.7
T2 (>0.50-0.80)	66	2.7	2.3-3.2	41.2	32.1-52.9	111.9	84.8-147.7	55.2	52.7-57.7	46.1	43.5-48.8	9.5	8.1-11.1
T3 (>0.80-3.75)	70	2.9	2.4-3.4	37.6	29.0-48.7	107.8	80.8-143.6	59.8	57.2-62.5‡	51.1	48.4-53.9	8.5	7.2-10.1
P_{trend}		0.72		0.68		0.55		0.06		0.06		0.73	
Unprocessed red meat intake[d]													
Low (0-0.14)	106	2.9	2.5-3.3	42.4	34.6-51.9	122.7	97.8-154.0	57.3	55.2-59.3	48.6	46.4-50.7	8.9	7.8-10.2
High (>0.14-2.50)	100	2.7	2.3-3.0	33.5	27.2-41.3	88.9	70.5-112.1	56.6	54.4-58.8	47.6	45.4-49.8	8.6	7.5-9.8
P_{trend}		0.37		0.14		0.07		0.68		0.58		0.68	
Organ meat intake[e]													
None (0)	124	2.7	2.4-3.1	39.6	32.9-47.5	109.2	89.1-133.9	58.7	56.9-60.6‡	50.2	48.3-52.1‡	8.7	7.7-9.7
Any (>0-0.79)	82	2.7	2.4-3.2	35.2	28-44.2	98.2	76.1-126.7	54.1	51.7-56.4‡	44.8	42.4-47.2‡	8.7	7.6-10.1
P_{trend}		0.95		0.45		0.54		0.004		0.001		0.92	
White fish meat intake[f]													
Q1 (0-0.13)	68	3.0	2.6-3.5	37.5	29.1-48.4	112.5	85.2-148.6	57.9	55.3-60.5	49.4	46.7-52.5	8.5	7.2-10.0
Q2 (>0.13-0.21)	52	2.9	2.4-3.4	30.6	23.3-40.2	87.4	64.7-117.9	56.0	53.2-58.8	47.0	44.1-49.9	8.4	7.0-10.0
Q3 (>0.21-0.29)	36	2.2	1.7-2.7	32.8	23.5-45.6	70.5	49.2-101.2	57.6	54.1-61.0	49.1	45.5-52.7	9.3	7.4-11.6
Q4 (>0.29-1.22)	50	2.9	2.4-3.5	52.6	38.4-72.2	152.0	107.7-214.6	56.2	52.9-59.5	46.8	43.4-50.2	9.1	7.4-11.2
P-trend		0.26		0.21		0.62		0.63		0.43		0.47	
Dark fish meat intake[g]													
Q1 (0-0.26)	54	2.5	2.1-3.0	45.5	33.7-61.4	114.0	81.7-159.0	57.7	54.6-60.7	49.0	45.8-52.1	8.3	6.9-10.1
Q2 (>0.26-0.40)	48	2.3	1.9-2.8	37.2	27.6-50.2	87.3	62.6-121.6	57.4	54.3-60.5	48.2	45.0-51.4	8.7	7.2-10.5
Q3 (>0.40-0.71)	52	3.4	2.8-4.1	31.7	24.0-42.0	107.2	78.3-146.8	56.8	53.9-59.7	48.1	45.1-51.1	7.8	6.5-9.3
Q4 (>0.71-2.57)	52	2.9	2.4-3.6	37.6	27.2-52.1	110.5	77.0-158.5	56.0	52.6-59.3	47.2	43.7-50.6	10.4	8.4-12.7
P-trend		0.07		0.28		0.95		0.48		0.51		0.37	
Shellfish intake[h]													
Q1 (0-0.04)	52	3.2	2.7-3.9	35.3	26.2-47.6	113.9	82.1-157.7	54.5	51.5-57.5	45.2	42.1-48.3	8.9	7.3-10.7
Q2 (>0.04-0.12)	33	2.1	1.6-2.6	32.1	22.3-46.3	66.6	44.7-99.2	51.8	48.1-55.5	42.0	38.2-45.7	8.1	6.4-10.2
Q3 (>0.12-0.14)	70	2.8	2.43.3	41.9	33.0-53.2	118.7	91.5154.2	58.6	56.2-61.1‡	49.4	46.9-51.8‡	9.2	7.9-10.7
Q4 (>0.14-1.23)	51	2.8	2.3-3.4	38.8	28.5-52.8	106.1	75.5-149.2	60.4	57.2-63.5‡	53.2	50.0-56.4‡	8.4	6.9-10.2
P-trend		0.67		0.42		0.66		0.001		<0.001		0.98	

CI, confidence interval

[a]Adjusted for calories intake, intakes of the remaining meats, dietary patterns, age, body mass index, smoking, physical activity, TV watching and abstinence time

[b]Aditionally adjusted for time to start semen analysis (minutes)

[d]includes hamburguer, sausages, bacon, other processed meats (e,g, ham, mortadella, salami), and pate and foie-gras; [c]includes beef, pork, lamb

[e]includes beef, calf, pork, chicken, turkey liver, and other organs (e,g, brains, sweetbread)

[f]includes hake, golden, sole (boiled, grilled or fried)

[g]includes salmon, anchovies, tuna, emperor, bonito, sardines, mackerel (boiled, grilled, canned, salted, smoked);

[h]includes clams, mussels, oysters, squid, cuttlefish, octopus, prawns, crabs, lobsters

*Back-transformed to original scale

‡Significantly different to mean in the lowest quartile of intake at 0.05

Supplemental Table 9. Multivariable adjusted[a] reproductive hormone levels (95% Confidence interval) in relation to subgroups of meat categories. Murcia Young Men's Study (n=206)

Meat intake (servings/day); range		**LH**		**FSH***		**Estradiol***		**Free Testosterone**		**Total testosterone**		**Inhibin B**		**SHBG**	
	n	IU/L	95% CI	IU/L	95% CI	pmol/L	95% CI	nmol/L	95% CI	nmol/L	95% CI	pg/mL	95% CI	nmol/L	95% CI
Processed red meat intake[b]															
T1 (0-0.50)	70	4.4	3.9-4.8	2.3	2.0-2.6	76.0	70.8 -81.6	14.5	13.2 -15.7	22.6	20.9 -24.2	207.2	188.1 -226.4	32.5	29.9 -35.0
T2 (>0.50-0.80)	66	4.1	3.7-4.5	2.2	1.9-2.5	71.1	66.2 -76.2	13.6	12.4 -14.8	20.6	18.9 -22.2	217.6	198.6 -236.5	30.6	28.1 -33.2
T3 (>0.80-3.75)	70	4.2	3.8-4.7	2.4	2.1-2.8	80.1	74.4 -86.1	14.7	13.4 -15.9	22.3	20.5 -24.0	184.4	164.6 -204.2	31.4	28.7 -34.0
Ptrend		0.59		0.59		0.43		0.89		0.73		0.16		0.54	
Unprocessed red meat intake[c]															
Low (0-0.14)	106	3.9	3.6-4.3	2.2	2.0-2.5	75.2	68.6 -82.4	14.2	13.3 -15.2	21.0	19.7 -22.3	210.0	194.4 -225.5	28.9	26.9 -30.9
High (>0.14-2.50)	100	4.6	4.2-4,9‡	2.4	2.1-2.7	78.5	72.4 -85.2	14.2	13.2 -15.3	22.7	21.3 -24.1	195.2	179.2 -211.2	34.2	32.2 -36.3‡
Ptrend		0.02		0.33		0.11		0.99		0.10		0.22		0.001	
Organ meat intake[d]															
None (0)	124	4.0	3.7-4.3	2.4	2.2-2.6	75.4	71.6 -79.4	13.8	12.9 -14.7	21.3	20.1 -22.5	199.5	185.7 -213.4	31.6	29.7 -33.5
Any (>0-0.79)	82	4.6	4.2-4.9‡	2.1	1.9-2.4	76.2	71.5 -81.3	14.9	13.8 -16.0	22.7	21.2 -24.2	207.7	190.5 -224.9	31.4	29.1 -33.6
Ptrend		0.03		0.20		0.80		0.12		0.15		0.48		0.87	
White fish meat intake[e]															
Q1 (0-0.13)	68	4.1	3.7-4.6	2.1	1.8-2.4	77.2	71.9-83.0	14.5	13.3-15.7	22.2	20.5-23.9	212.2	193.0 -231.4	32.3	29.7-34.8
Q2 (>0.13-0.21)	52	4.4	3.9-4.9	2.8	2.4-3.2	72.2	66.8-78.3	13.1	11.8-14.5	21.3	19.5-23.2	201.7	180.6 -222.9	33.8	31.0-36.6
Q3 (>0.21-0.29)	36	4.5	3.9-5.0	2.1	1.8-2.6	78.9	71.7-86.7	14.7	13.1-16.3	21.9	19.7-24.2	179.8	154.6 -205.1	29.4	26.1-32.8
Q4 (>0.29-1.22)	50	4.0	3.5-4.6	2.2	1.9-2.6	75.1	68.6-82.2	14.7	13.2-16.2	21.7	19.6-23.8	207.8	183.9 -231.7	29.6	26.4-32.8
P-trend		0.99		0.94		0.96		0.63		0.83		0.39		0.09	
Dark fish meat intake[f]															
Q1 (0-0.26)	54	4.3	3.8-4.8	2.2	1.9-2.6	75.2	69.3-81.6	14.4	13.0-15.8	21.7	19.9-23.6	198.6	177.3 -219.8	30.5	27.6-33.4
Q2 (>0.26-0.40)	48	4.5	4.0-5.0	2.6	2.2-3.0	77.1	70.8-83.9	14.8	13.4-16.2	23.0	21.1-25.0	190.7	168.6 -212.9	33.3	30.2-36.3
Q3 (>0.40-0.71)	52	4.3	3.8-4.8	2.6	2.2-3.0	76.2	70.3-82.5	13.7	12.3-15.1	21.5	19.7-23.4	198.8	168.9 -210.7	32.7	29.9-35.6
Q4 (>0.71-2.57)	52	3.8	3.3-4.4	1.9	1.6-2.2	74.6	68.2-81.6	14.1	14.1-15.6	21.1	19.0-23.2	231.3	207.9 -254.7	29.7	26.5-32.9
P-trend		0.27		0.38		0.92		0.57		0.54		0.14		0.88	
Shellfish intake[g]															
Q1 (0-0.04)	52	4.2	3.7-4.7	2.3	1.9-2.6	77.2	71.5-83.5	14.6	13.2-15.9	22.5	20.7-24.3	187.0	165.7 -208.4	31.9	29.0-34.7
Q2 (>0.04-0.12)	33	4.1	3.5-4.8	1.9	1.6-2.3	86.6	78.3-95.7	14.5	12.7-16.3	22.1	19.7-24.5	197.0	169.4 -224.6	30.8	27.0-34.5
Q3 (>0.12-0.14)	70	4.4	4.0-4.8	2.3	2.0-2.0	76.1	71.2-81.3	14.6	13.5-15.8	22.5	20.9-24.1	209.5	191.4 -227.5	32.2	29.7-34.6
Q4 (>0.14-1.23)	51	4.1	3.6-4.6	2.5	2.1-2.1	67.8	62.5-73.6‡	13.2	11.8-14.6	20.0	18.1-22.0	213.4	190.9 -235.9	30.7	27.6-33.7
P-trend		0.98		0.26		0.02		0.29		0.15		0.07		0.76	

LH, luteinizing hormone; FSH, follicle-stimulating hormone; SHBG, sex hormone-binding globulin; CI, confidence interval;[a]Adjusted for calories intake, intakes of the remaining meats, dietary patterns, age, body mass index, smoking, physical activity, TV watching and time of blood draw

[b]includes hamburguer, sausages, bacon, other processed meats (e,g, ham, mortadella, salami), and pate and foie-gras

[c]includes beef, pork, lamb

[d]includes beef, calf, pork, chicken, turkey liver, and other organs (e,g, brains, sweetbread)

[e]includes hake, golden, sole (boiled, grilled or fried)

[f]includes salmon, anchovies, tuna, emperor, bonito, sardines, mackerel (boiled, grilled, canned, salted, smoked)

[g]includes clams, mussels, oysters, squid, cuttlefish, octopus, prawns, crabs, lobsters

*Back transformed to original scale. ‡Significantly different to mean in the lowest quartile of intake at 0.05