



한우고기와 수입 쇠고기의 품질 특성 비교

2012년 5월 24일

발 표 자 : 주 선 태

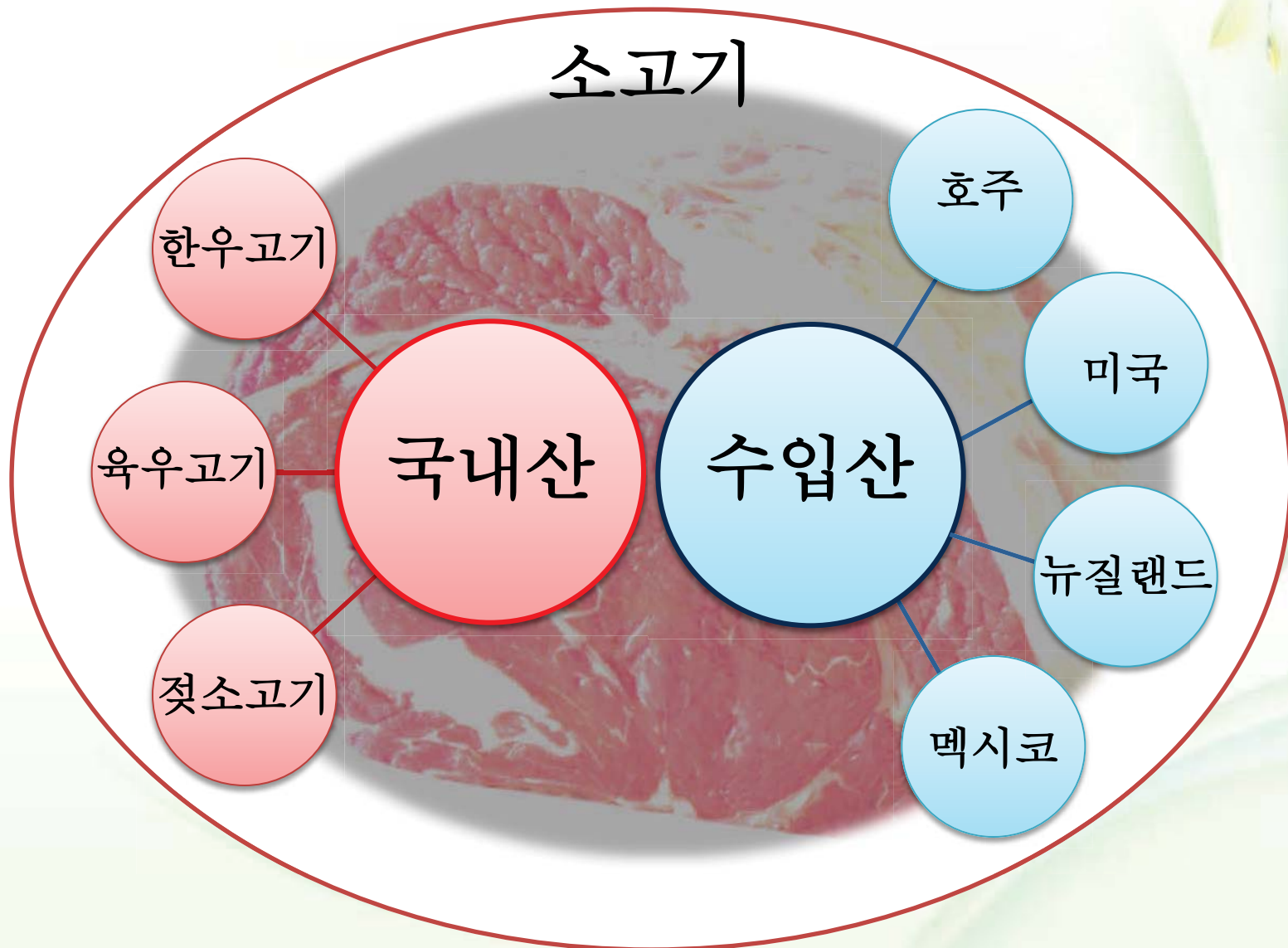
(경상대학교 축산학과)

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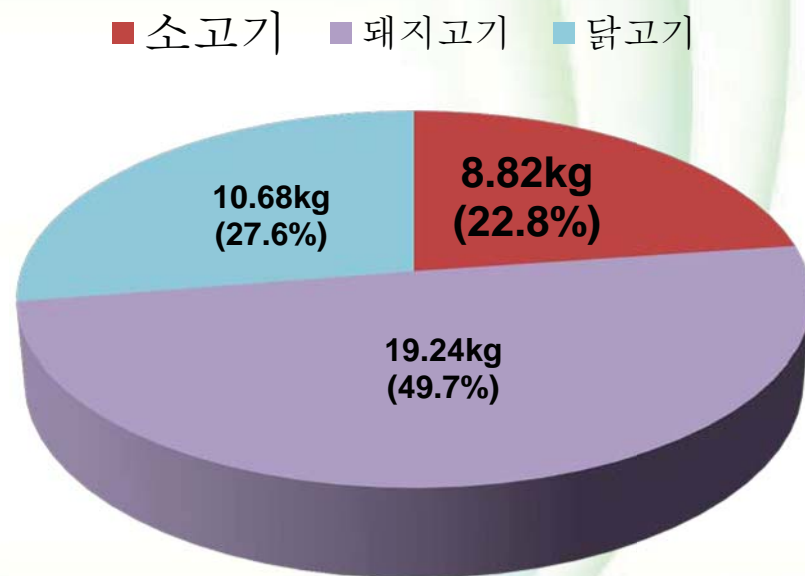
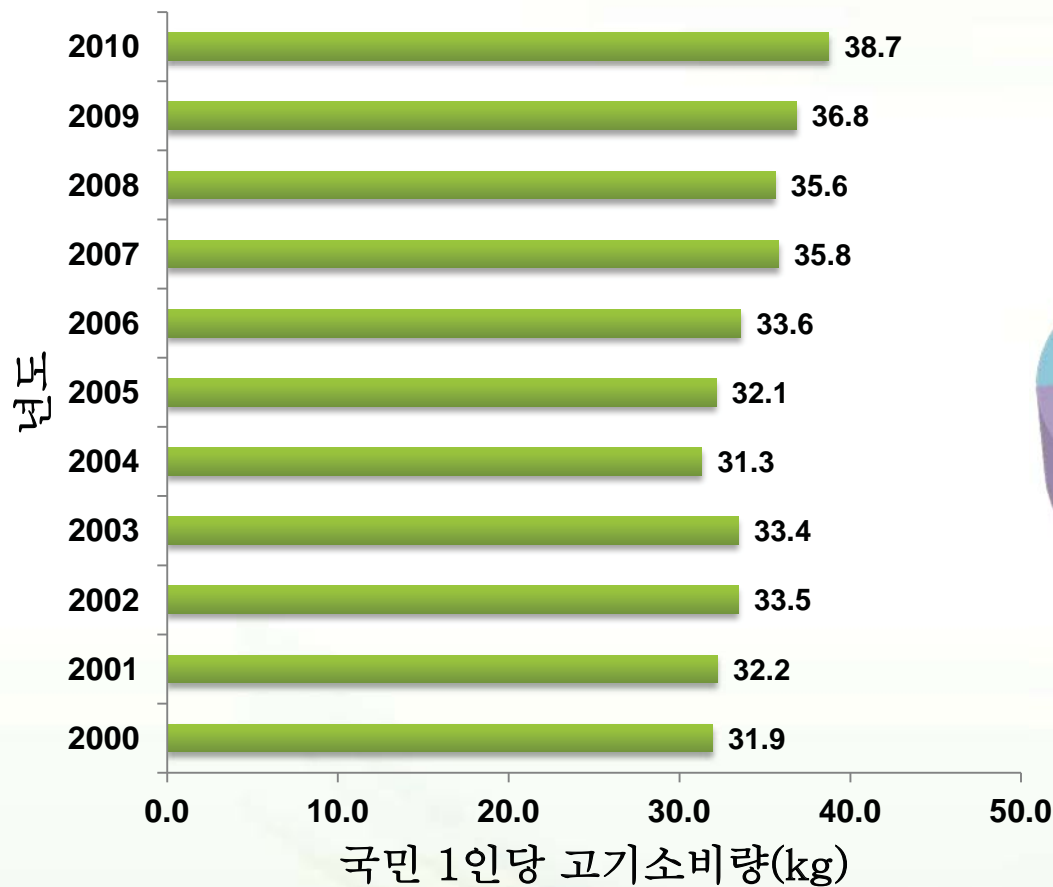
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1. 한우고기와 수입산 쇠고기의 구분



★육우고기 : 육용종, 교잡종, 젓소수소, 미경산 젓소암소 및 6개월 이상 기른 수입 생우 포함

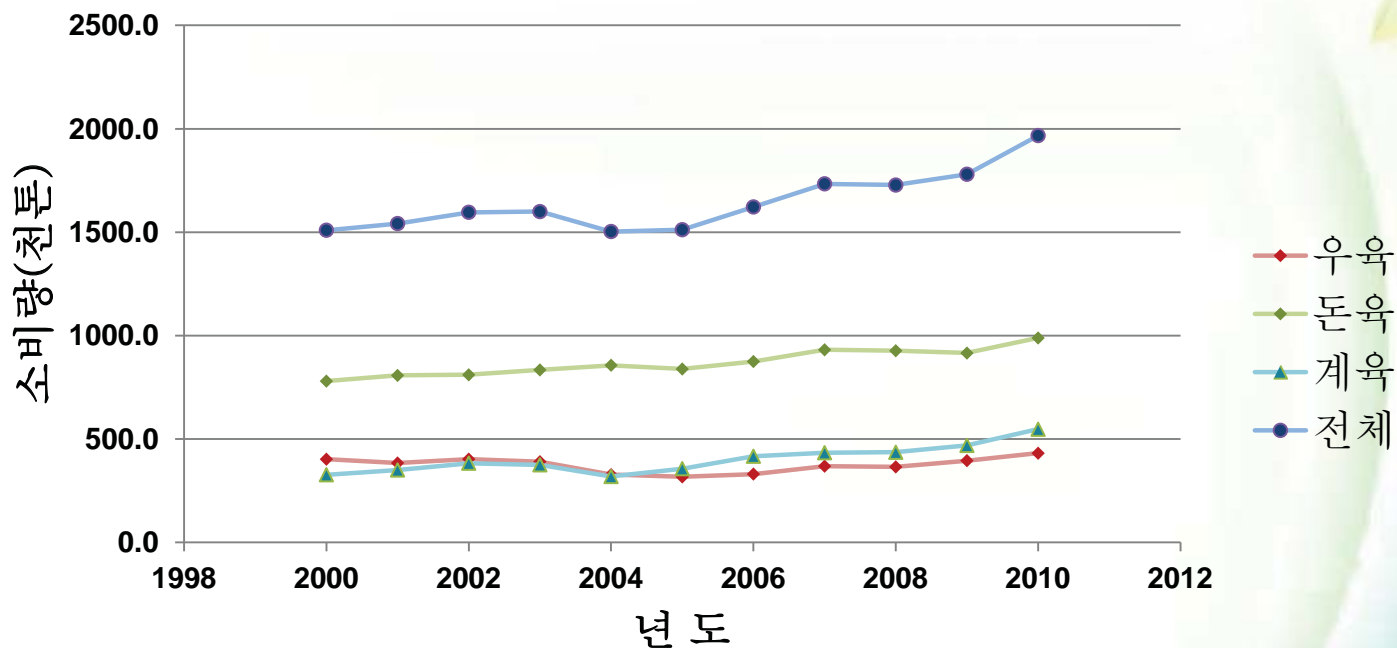
2. 소고기 수급현황



2010년 1인당 주요 식육 소비량

((사)한국육류유통수출입협회, 식육편람 2011)

2. 소고기 수급현황



년도	전체소비량(톤)			
	우육	돈육	계육	계
2000	402,381	779,908	327,298	1,509,587
2005	316,853	838,479	356,743	1,512,075
2010	431,299	988,558	547,387	1,967,244

((사)한국육류유통수출입협회, 식육편람 2011)

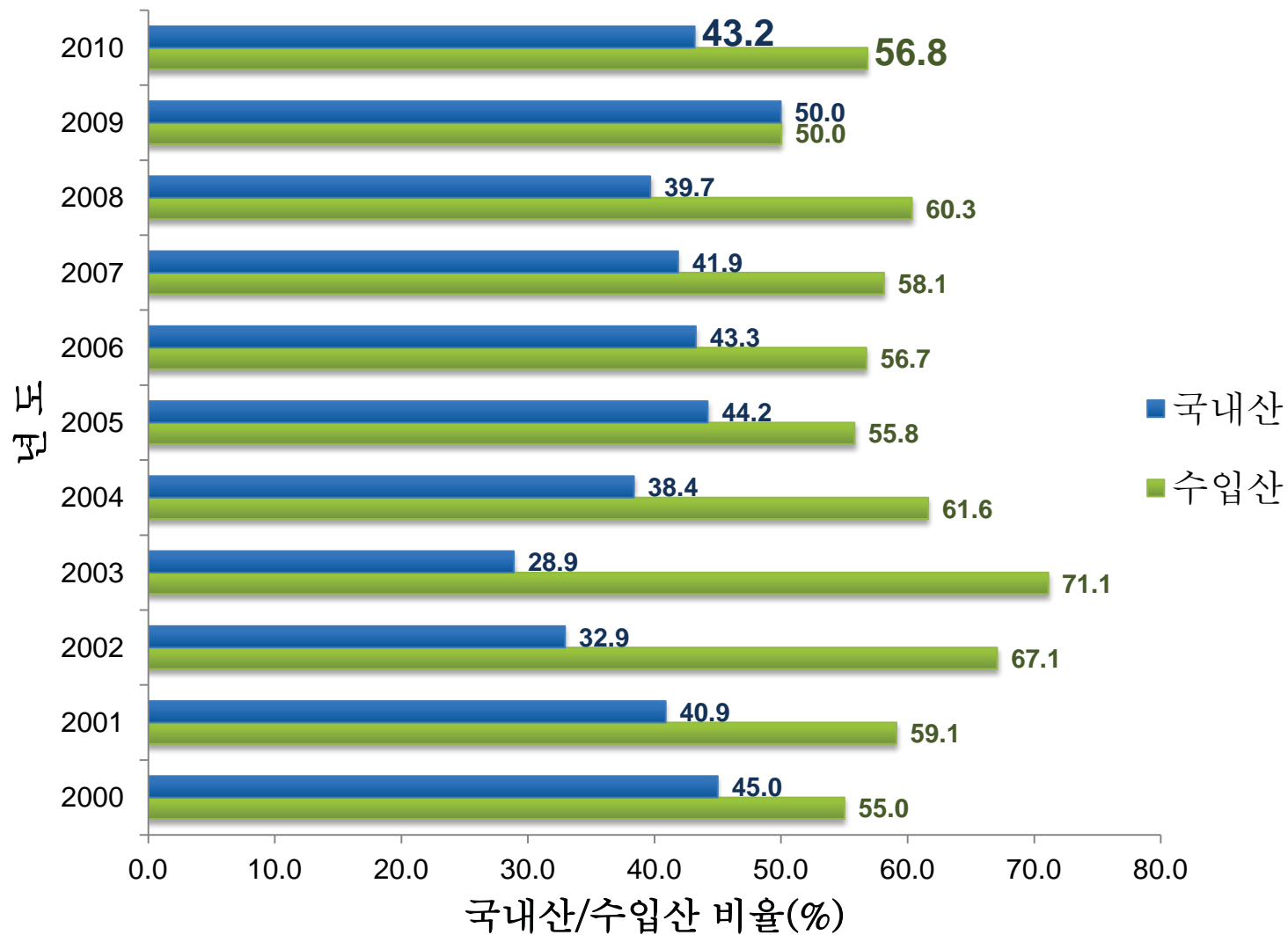
3. 소고기 수입현황

(단위:톤)

년도	수입육			국내산			계
	이월	당년수입	소계	이월	당년생산	소계	
2000	38,988	222,768	261,756		214,108	214,108	475,864
2001	71,741	165,957	237,698	1,742	162,643	164,385	402,083
2002	18,026	282,246	300,272		147,416	147,416	447,688
2003	55,000	293,606	348,606		141,579	141,579	490,185
2004	99,852	132,874	232,726		144,902	144,902	377,628
2005	49,852	142,593	192,445		152,424	152,424	344,869
2006	28,016	179,405	207,421		158,161	158,161	365,582
2007	35,028	202,785	237,813		171,247	171,247	409,060
2008	40,311	224,092	264,403		173,813	173,813	438,216
2009	-	197,860	197,860		197,676	197,676	395,536
2010	-	245,086	245,086		186,200	186,200	431,286
2011	-	289,386	289,386	- 미집계 -			

((사)한국육류유통수출입협회, 식육편람 2011)

3. 소고기 수입현황 (국내산/수입산 비율)

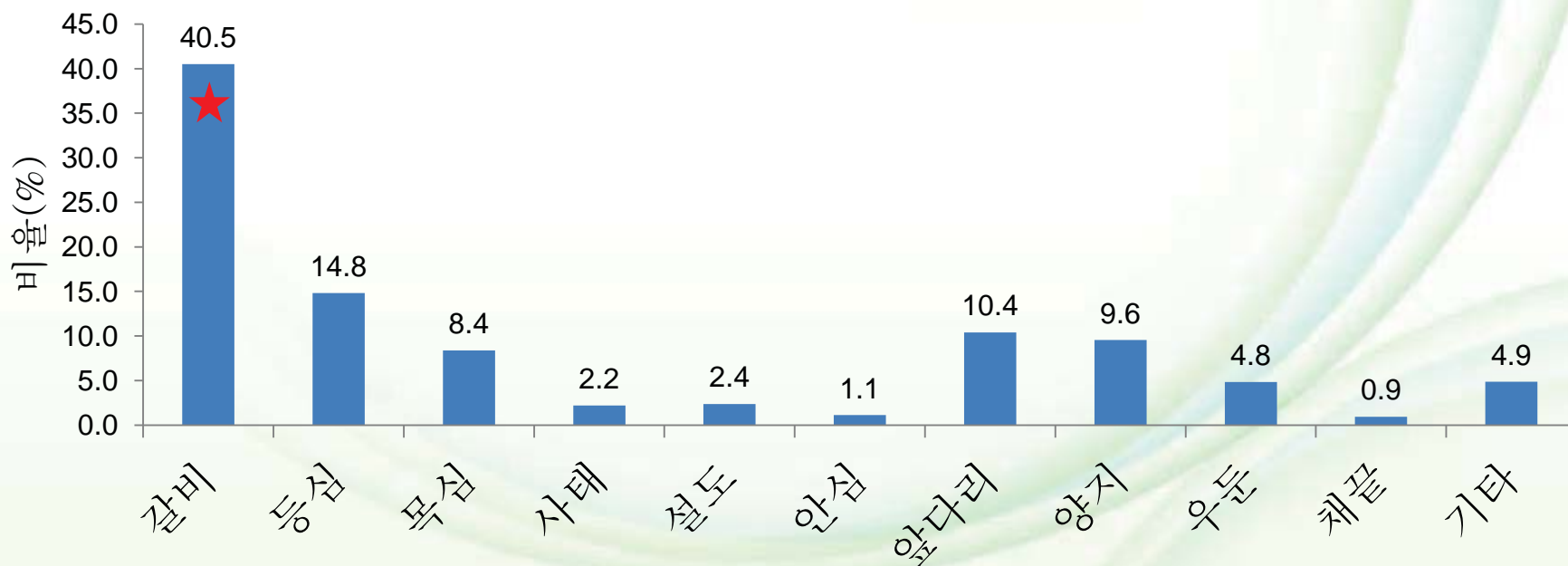


3. 소고기 수입현황 (수입국별 현황, 2010년 기준)

수입국	구분	수입량(톤)	비율(%)	
			수입국별	총수입량 기준
미국	냉장	7,955	8.8	3.2
	냉동	82,614	91.2	33.7
	소계	90,569	-	37.0
호주	냉장	33,305	27.3	13.6
	냉동	88,485	72.7	36.1
	소계	121,790	-	49.7
뉴질랜드	냉장	797	2.6	0.3
	냉동	30,150	97.4	12.3
	소계	30,947	-	12.6
멕시코	냉장	23	1.3	0.0
	냉동	1,757	98.7	0.7
	소계	1,780	-	0.7
냉장 소계		42,080	17.2	17.2
냉동 소계		203,006	82.8	82.8
합 계		245,086	-	100.0

3. 소고기 수입현황 (부위별 현황, 2010년 기준)

구 분	갈비	등심	목심	사태	설도	안심	앞다리	양지	우둔	채끝	기타	계
미국	56,084	7,229	15,527	157	168	69	1,418	9,289	533	74	21	90,569
호주	29,052	26,661	4,710	4,643	4,453	2,397	19,338	9,838	7,403	2,012	11,283	121,790
뉴질랜드	13,116	2,413	150	561	1,151	255	4,616	4,028	3,893	178	586	30,947
멕시코	1,011	53	175	51	19	30	93	285	21	23	19	1,780
소계	99,263	36,356	20,562	5,412	5,791	2,751	25,475	23,440	11,850	2,287	11,909	245,086



4. 한우고기와 수입산 쇠고기의 품질특성 비교

관련
연구

Korean J. Food Sci. Ani. Resour.
Vol. 31, No. 6, pp. 935-943(2011)
DOI: http://dx.doi.org/10.5851/kofa.2011.31.6.935

ARTICLE

한우고기와 뉴질랜드산 냉장수입육의 육질 및 영양성분 비교

조수현¹ · 강대우² · 김진형³ · 박범영⁴ · 정명목⁵ · 조용민⁶ · 김동훈⁷
동물자원연구 22(1):42-51 (2011)
Annals of Animal Resources Sciences 22(1):42-51 (2011)

한우고기와 수입육 등심과 흥두깨 부위의 휘

조수현¹ · 성필남² · 강근호³ · 정석근⁴ · 김현섭⁵ · 박범영⁶



Korean J. Food Sci. Ani. Resour.
Vol. 31, No. 5, pp. 772-781(2011)
DOI: http://dx.doi.org/10.5851/kofa.2011.31.5.772

ARTICLE

한우고기와 호주산 냉장수입육의 육질 및 영양

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Korean J. Food Sci. Ani. Resour.
Vol. 29, No. 1, pp. 91-98(2009)

한우고기 및 호주산 Wagyu 쇠고기 채끝육의 이화학적특성과 관능특성

이종문¹ · 김태우² · 김진형³ · 조수현⁴ · 성필남⁵ · 정명목⁶ · 조용민⁷ · 박범영⁸ · 김동훈⁹
KOREAN J. FOOD SCI. ANI. RESOUR.
Vol. 19, No. 4, pp. 331-338(1999)

한우 및 수입 쇠고기 냉장 등심의 물리·화학적, 미생물학적 및 관능적 품질 특성

김일석¹ · 이상욱² · 강석남³ · 변준석⁴ · 이무하⁵
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KOREAN J. FOOD SCI. ANI. RESOUR.
Vol. 19, No. 4, pp. 331-338(1999)

한우 및 수입 쇠고기 냉장 등심의 물리·화학적, 미생물학적 및 관능적 품질 특성

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*한국육류수출협회

품질도 다르고
수입국가도 다르고
사육조건도 다르고 ...

4. 한우고기와 수입산 쇠고기의 품질특성 비교

국내 소비자들의 인식

맛
(풍미)

마블링

신선도

영양

한우고기
Ⅱ
고급육

(가정에서 구매하는 소고기 종류)

한우 (60.46%) > 호주산 (25.74%) > 육우 (8.29%) > 미국산 (5.28%)

소비자가 생각하는

한우고기와 수입산 쇠고기의 품질 차이는...?

맛 (52.4%) > 신선도 (19.9%) > 냄새 (9.6%)



한우고기와 호주산 냉장쇠고기

Table 1. Chemical composition and meat quality of Korean Hanwoo and imported Australian beef

Items	Strip Loin				Loin				Top round				Chuck tender		
	Hanwoo		Australia		Hanwoo		Australia		Hanwoo		Australia		Hanwoo		Australia
	1 ⁺	1	Angus	Cross	1 ⁺	1	Angus	Cross	1 ⁺	1	Angus	Cross	1 ⁺	1	Angus
Protein (%)	19.47 ^b ±0.43	20.11 ^b ±0.38	21.30 ^a ±0.18	21.71 ^a ±0.21	17.28 ^b ±0.84	18.66 ^b ±0.89	20.14 ^a ±0.19	21.65 ^a ±0.09	22.00 ±0.22	21.97 ±0.23	21.65 ±0.32	22.37 ±0.31	20.54 ±0.73	19.57 ±0.57	19.28 ±0.18
Moisture (%)	66.46 ±1.65	67.71 ±1.11	66.26 ±0.45	68.55 ±0.35	61.89 ^b ±1.07	62.12 ^b ±1.99	68.35 ^a ±0.41	68.20 ^a ±0.47	70.48 ±0.71	71.58 ±0.40	70.65 ±0.69	71.68 ±0.26	68.86 ^b ±3.63	71.12 ^a ±1.69	71.98 ^a ±0.34
Fat (%)	15.48 ^a ±0.92	12.48 ^{ab} ±0.87	11.50 ^a ±0.58	8.83 ^b ±1.51	17.00 ^a ±0.78	16.52 ^a ±0.95	10.59 ^b ±0.53	9.21 ^b ±0.57	7.08 ^{ab} ±0.82	4.19 ^c ±0.43	6.81 ^a ±0.93	4.97 ^{bc} ±0.24	9.62 ±4.02	6.62 ±2.17	7.80 ±0.41
Cooking loss (%)	23.35 ^b ±1.80	23.18 ^b ±1.45	28.95 ^a ±3.22	26.22 ^{ab} ±2.2	20.93 ^b ±0.62	26.85 ^b ±0.39	30.2 ^a ±3.71	22.46 ^b ±1.38	24.75 ±3.06	29.77 ±0.81	29.60 ±2.72	27.74 ±3.53	24.00 ^b ±3.48	26.74 ^{ab} ±0.39	30.20 ^a ±3.7
WBS (kg) ^{**}	2.53 ^{ab} ±0.21	2.43 ^{ab} ±0.23	2.13 ^b ±0.09	3.02 ^a ±0.13	2.19 ±0.23	1.96 ±0.23	2.54 ±0.18	2.07 ±0.07	3.60 ±0.32	3.23 ±0.66	3.16 ±0.05	2.98 ±0.13	3.66 ^a ±0.27	3.67 ^a ±0.34	2.83 ^b ±0.07
Meat color	CIE	38.56 ^b	36.93 ^b	40.96 ^a	41.53 ^a	41.33	40.80	39.84	41.71	37.39 ^b	35.92 ^b	37.62 ^b	42.49 ^a	38.22	35.97
	L*	±0.97	±0.80	±0.52	±0.78	±1.02	±1.61	±0.85	±0.49	±1.56	±0.96	±1.32	±1.55	±3.32	±1.11
	CIE	21.53	21.36	23.20	20.97	24.76	22.42	23.92	22.07	24.17	21.09	24.34	24.26	24.32	24.30
	a*	±0.96	±0.93	±0.41	±0.46	±1.32	±1.79	±0.66	±0.63	±0.48	±1.28	±0.75	±0.48	±3.62	±1.21
	CIE	12.75 ^b	10.82 ^b	11.85 ^b	17.90 ^a	14.68 ^b	12.81 ^b	12.45 ^b	18.15 ^a	14.16 ^b	10.44 ^c	12.18 ^{bc}	19.77 ^a	13.72 ^a	13.72 ^a
	b*	±0.76	±0.76	±0.25	±0.48	±0.99	±0.81	±0.57	±0.30	±1.21	±0.85	±0.71	±0.69	±2.56	±0.85

Values are Mean±SE.

**Warner-Bratzler shear force

^{a-c}Means in the same row within the same category with different letters are significantly different($p<0.05$).

(Cho et al., 2011a)

한우고기와 뉴질랜드산 냉장쇠고기

Table 1. Chemical composition and meat quality of Korean Hanwoo (QG 1⁺, 1) and imported New Zealand black Angus beef

		Strip loin			Loin			Chuck tender			Eye of round		
		Hanwoo		New Zealand	Hanwoo		New Zealand	Hanwoo		New Zealand	Hanwoo		New Zealand
		1 ⁺	1		1 ⁺	1		1 ⁺	1		1 ⁺	1	
Protein (%)		19.47 ^b	20.11 ^b	22.73 ^a	17.28 ^b	18.66 ^b	23.01 ^a	20.54 ^b	19.57 ^b	21.26 ^a	21.76	22.61	21.24
		±0.43	±0.38	±0.26	±0.84	±0.89	±0.16	±0.24	±0.18	±0.34	±0.03	±0.29	±0.67
Moisture (%)		65.05 ^b	66.51 ^{ab}	68.57 ^a	63.89 ^b	64.82 ^b	69.39 ^a	68.86 ^c	71.12 ^b	72.31 ^a	70.50 ^b	69.98 ^b	72.23 ^a
		±1.65	±1.11	±0.93	±1.07	±1.99	±0.11	±1.21	±0.53	±0.34	±0.96	±0.82	±0.42
Fat (%)		15.48 ^a	12.48 ^{ab}	7.79 ^b	17.00 ^a	15.42 ^a	6.71 ^b	9.62 ^a	6.62 ^b	5.50 ^b	6.65	6.11	5.59
		±0.92	±0.87	±1.08	±0.78	±0.95	±0.30	±1.34	±0.68	±0.40	±1.72	±0.6	±0.55
Meat color	CIE L*	38.56 ^{ab}	36.93 ^b	41.23 ^a	41.33	40.80	39.69	38.22	38.48	41.33	40.32 ^b	38.91 ^b	43.64 ^a
		±0.97	±0.80	±1.31	±1.02	±1.61	±0.80	±1.11	±1.15	±0.60	±0.73	±0.48	±1.34
	CIE a*	21.53	21.36	19.36	24.76	22.42	20.20	24.30 ^a	23.53 ^a	19.98 ^b	24.19	21.96	21.14
		±0.96	±0.93	±2.52	±1.32	±1.79	±1.35	±1.21	±1.43	±0.53	±1.31	±1.02	±1.4
	CIE b*	12.75	10.82	11.65	14.68	12.81	11.23	13.72 ^a	11.90 ^a	11.04 ^b	14.77 ^a	11.24 ^b	12.61 ^{ab}
		±0.74	±0.76	±0.74	±0.99	±0.81	±0.76	±0.85	±0.93	±0.21	±0.89	±0.91	±0.78
WBS** (kgf)		2.53	2.43	2.04	2.19	1.96	1.98	3.66 ^a	3.67 ^a	2.76 ^b	4.22	3.77	3.29
		±0.21	±0.23	±0.08	±0.23	±0.23	±0.10	±0.27	±0.34	±0.05	±0.49	±0.49	±0.17
Cooking loss (%)		23.35 ^b	23.18 ^b	33.49 ^a	20.93 ^b	26.85 ^b	33.17 ^a	24.00 ^b	26.74 ^b	32.31 ^a	23.83 ^c	27.22 ^b	33.34 ^a
		±1.96	±0.84	±0.62	±0.62	±0.39	±0.33	±1.42	±1.41	±0.72	±1.19	±0.63	±0.92

*Mean±SE

**Warner-bratzler shear force

^{a-b} Means in the same row within the same category with different letters are significantly different ($p<0.05$).

(Cho et al., 2011b)

한우고기와 호주산 Wagyu쇠고기

Table 1. Chemical composition of *M. Longissimus Lumborum* of Hanwoo beef and Australian Wagyu beef

Items	Hanwoo beef ¹⁾			Australian beef (n=16)
	Grade 1 ⁺⁺ (n=27)	Grade 1 ⁺ (n=14)	Grade 1 (n=40)	
Moisture (%)	54.07 ^c ± 0.91 ²⁾	63.13 ^b ± 1.01	66.84 ^a ± 0.51	64.77 ^{ab} ± 0.32
Curde fat (%)	26.58 ^a ± 1.43	16.39 ^b ± 1.28	11.29 ^c ± 0.53	11.87 ^c ± 0.36
Curde protein (%)	19.76 ^a ± 1.42	19.20 ^a ± 0.26	20.35 ^a ± 0.30	21.12 ^a ± 0.14
Curde ash (%)	0.58 ^c ± 0.02	0.78 ^b ± 0.04	0.87 ^a ± 0.01	0.83 ^{ab} ± 0.02

¹⁾Quality grade of Korean carcass grading system (Grade 1⁺⁺, Grade 1⁺, Grade 1, Grade 2 and Grade 3).

²⁾Mean ± SE.

^{a-c}Means in the row with different letters are significantly different ($p < 0.05$).

Table 2. The meat color, Warner-Bratzler shear force, cooking loss, pH, and water holding capacity of *M. Longissimus Lumborum* of Hanwoo beef and Australian Wagyu beef

Items	Hanwoo beef ¹⁾			Australian beef (n=16)
	Grade 1 ⁺⁺ (n=27)	Grade 1 ⁺ (n=14)	Grade 1 (n=40)	
CIE L	43.15 ^a ± 0.61 ²⁾	37.89 ^c ± 0.88	37.56 ^c ± 0.48	39.92 ^b ± 0.83
a	24.33 ^a ± 0.27	20.40 ^b ± 0.75	20.91 ^b ± 0.51	23.77 ^a ± 0.38
b	12.90 ^a ± 0.20	9.41 ^b ± 0.57	9.38 ^b ± 0.36	12.98 ^a ± 0.28
WBs (kg)	2.93 ^b ± 0.21	4.60 ^a ± 0.26	5.43 ^a ± 0.35	2.81 ^b ± 0.06
Cooking loss (%)	21.19 ^{ab} ± 0.61	20.49 ^b ± 1.11	21.13 ^{ab} ± 0.79	23.59 ^a ± 0.50
pH	5.61 ^a ± 0.03	5.58 ^a ± 0.02	5.60 ^a ± 0.02	5.48 ^b ± 0.01
WHC (%)	60.05 ^a ± 0.08	57.70 ^b ± 0.36	55.97 ^{bc} ± 0.36	55.08 ^c ± 0.19

¹⁾Quality grade of Korean carcass grading system (Grade 1⁺⁺, Grade 1⁺, Grade 1, Grade 2 and Grade 3).

²⁾Mean ± SE.

WBs : Warner-Bratzler shear force.

WHC : water holding capacity.

^{a-c}Means in the row with different letters are significantly different ($p < 0.05$).

(Lee et al., 2009)

한우고기와 호주산&미국산 냉장쇠고기

Table 1. Proximate analysis of composition of chilled two imported beef loins and Han-woo loins(%)

	Ash	Fat ***	Protein	Moisture***
Han-woo	1.09±0.11	16.90±1.60 ^a	19.86±1.24	62.15±0.48 ^b
American	1.07±0.13	10.93±0.69 ^b	20.63±0.91	67.36±0.17 ^c
Australian	0.98±0.01	5.69±1.67 ^c	20.66±0.06	72.67±0.16 ^a

^{a,b,c} Means±SD with different superscript in the same column differ significantly.

*** : P<0.001

Table 3. pH, cooking loss, water holding capacity and shear force of chilled two imported beef loins and Han-woo loins

	pH	Cooking loss(%)	Water holding capacity(%)*	Shear force(kg)***
Han-woo	5.60±0.05	41.05±0.90	40.14±0.06 ^a	47.20±0.95 ^a
American	5.40±0.02	44.63±3.56	32.4 ±0.27 ^b	26.93±2.11 ^b
Australian	5.11±0.58	42.70±1.61	43.63±5.75 ^a	31.07±4.61 ^b

^{a,b,c} Means±SD with different superscript in the same column differ significantly.

* : P<0.05, *** : P<0.001

Table 4. L*, a*, b* values of chilled two imported beef loins and Han-woo loins

	L* value [^]	a* value	b* value [^]
Han-woo	40.83±0.96 ^b	18.77±1.13	8.36±0.18 ^b
American	44.76±0.18 ^a	20.30±0.37	10.84±0.46 ^a
Australian	36.41±0.52 ^c	19.17±1.84	8.66±0.27 ^b

^{a,b,c} Means±SD with different superscript in the same column differ significantly.

[^] : P<0.001

(Kim et al., 1999a)

한우고기와 호주산&미국산 냉동쇠고기

Table 1. Proximate analysis of compositions of two imported frozen beef loins and Han-woo loins(%)

	Crude ash	Crude fat***	Crude protein***	Moisture***
Han-woo	0.98 ± 0.04	6.11 ± 0.04 ^a	21.88 ± 0.01 ^c	71.03 ± 0.04 ^c
American	0.94 ± 0.003	18.84 ± 1.64 ^b	17.48 ± 0.96 ^b	62.74 ± 0.91 ^b
Australian	0.92 ± 0.01	11.82 ± 0.09 ^c	19.70 ± 0.03 ^a	67.56 ± 0.10 ^a

^{a, b, c} Means ± SD with different superscripts in the same column differ significantly.

* : p < 0.05, ** : p < 0.01, *** : p < 0.001.

Table 3. pH, cooking loss, water holding and shear force of two imported frozen beef loins and Han-woo loins

	pH***	Cooking loss*	Water holding capacity	Shear force***
Han-woo	5.51 ± 0.02 ^c	42.19 ± 1.95 ^b	41.10 ± 8.08	59.67 ± 8.23 ^b
American	5.34 ± 0.01 ^b	37.86 ± 2.13 ^a	33.33 ± 0.72	35.30 ± 2.69 ^b
Australian	5.44 ± 0.01 ^a	44.52 ± 2.23 ^a	36.58 ± 2.01	27.80 ± 0.53 ^a

^{a, b, c} Mean ± SD with different superscripts in the same column differ significantly.

* : p < 0.05, *** : p < 0.001.

Table 4. L*, a*, b* values of two imported frozen beef loins and Han-woo loins

	L* value [↓]	a* value	b* value [↓]
Han-woo	33.43 ± 1.00 ^{ab}	17.32 ± 1.14	6.07 ± 0.51 ^a
American	37.61 ± 0.59 ^a	22.99 ± 2.55	8.83 ± 1.03 ^a
Australian	44.04 ± 5.64 ^b	20.32 ± 3.89	10.23 ± 0.60 ^b

^{a, b} Means ± SD with different superscript in the same column differ significantly.

[↓] : p < 0.05, [↓] : p < 0.01.

(Kim et al., 2000)

한우고기와 호주산&뉴질랜드산 냉장쇠고기

Fatty acids	Loin			
	Hanwoo		Australia	
	1 ⁺	1	Angus	Cross
Myristic acid	3.79 ^a ±0.32	3.28 ^{ab} ±0.15	2.50 ^b ±0.17	3.71 ^a ±0.24
Palmitic acid	29.04 ^{ab} ±0.81	26.68 ^b ±1.27	29.16 ^{ab} ±0.42	31.70 ^a ±1.17
→ Palmitoleic acid	4.44 ^a ±0.19	5.62 ^a ±1.22	3.76 ^b ±0.15	2.67 ^c ±0.14
Stearic acid	11.33 ^b ±0.81	11.14 ^b ±0.73	13.11 ^b ±0.25	18.83 ^a ±0.38
Vaccenic acid	0.34 ^a ±0.12	-	0.24 ^{ab} ±0.03	0.16 ^b ±0.01
→ Oleic acid	49.19 ^a ±1.19	48.05 ^a ±0.73	46.03 ^{ab} ±0.47	40.92 ^b ±1.66
Linoleic acid	1.35 ^b ±0.25	0.48 ^c ±0.32	2.19 ^a ±0.13	1.55 ^{ab} ±0.1
Linolenic acid	0.08 ^b ±0.01	0.07 ^b ±0.01	0.21 ^a ±0.01	0.19 ^a ±0.01
γ-linolenic acid	0.05 ^b ±0.01	0.11 ^a ±0.05	0.04 ^b ±0.01	0.06 ^b ±0.00
Eicosenoic acid	0.35 ^a ±0.05	0.52 ^a ±0.47	0.10 ^b ±0.02	0.05 ^b ±0.01
Arachidonic acid	0.09 ±0.02	0.13 ±0.00	0.05 ±0.02	0.10 ±0.01
Eicosapentaenoic acid	-	-	-	0.05 ±0.01
Docosahexaenoic acid	-	-	-	0.01 ±0.01
SFA **	43.49 ^c ±1.46	41.10 ^c ±0.69	47.77 ^b ±0.62	54.24 ^a ±1.63
→ MUFA **	55.95 ^a ±1.66	56.18 ^a ±0.96	50.73 ^b ±0.52	43.80 ^c ±1.58
PUFA **	1.60 ^b ±0.27	0.93 ^c ±0.26	2.49 ^a ±0.16	1.96 ^{ab} ±0.11
MUFA/SFA	1.29 ^{ab} ±0.08	1.37 ^a ±0.04	1.06 ^a ±0.03	0.81 ^b ±0.05
PUFA/SFA	0.04 ^{ab} ±0.01	0.02 ^b ±0.01	0.05 ^a ±0.00	0.04 ^{ab} ±0.00
n-3	0.08 ^b ±0.03	0.07 ^b ±0.01	0.21 ^a ±0.01	0.24 ^a ±0.02
n-6	1.52 ^a ±0.26	0.71 ^b ±0.27	2.29 ^a ±0.15	1.73 ^a ±0.1

(Cho et al., 1999a)

Amino acids (%)	Loin		
	Hanwoo	New zealand	
	1 ⁺	1	Angus
C14:0	3.79 ^a ±0.32	3.28 ^{ab} ±0.15	2.59 ^b ±0.15
C16:0	29.04 ±0.81	26.68 ±1.27	28.59 ±0.45
→ C16:1n7	4.44 ^a ±0.19	5.62 ^a ±1.22	3.48 ^b ±0.14
C18:0	11.33 ^b ±0.81	11.14 ^b ±0.73	15.32 ^a ±0.55
C18:1n7	0.34 ^a ±0.12	-	0.17 ^b ±0.05
→ C18:1n9	50.44 ^a ±1.19	48.05 ^a ±0.73	45.38 ^b ±0.51
C18:2n6	1.35 ±0.25	0.67 ±0.27	0.83 ±0.09
C18:3n3	0.04 ^b ±0.01	0.07 ^b ±0.01	0.23 ^a ±0.02
C18:3n6	0.05 ±0.01	0.11 ±0.02	0.05 ±0.01
C20:1n9	0.35 ±0.05	0.52 ±0.47	0.27 ±0.04
C22:4n6	0.09 ±0.02	0.13 ±0.01	0.11 ±0.02
C22:4n6	-	-	-
SFA **	43.49 ^b ±1.46	41.10 ^b ±0.69	46.5 ^a ±0.47
→ MUFA **	55.95 ^a ±1.66	56.18 ^a ±0.96	49.30 ^b ±0.52
PUFA **	1.60 ±0.27	0.93 ±0.26	1.22 ±0.12
MUFA/SFA	1.29 ^{ab} ±0.08	1.37 ^a ±0.03	1.13 ^b ±0.02
PUFA/SFA	0.04 ±0.01	0.02 ±0.01	0.03 ±0.00
n3	0.08 ^b ±0.03	0.07 ^b ±0.01	0.23 ^a ±0.02
n6	1.52 ±0.26	0.71 ±0.26	0.98 ±0.11

(Cho et al., 1999b)

한우고기가
palmitoleic
acid, oleic
acid, MUFA
함량이 높다.

한우고기와 호주산&뉴질랜드산 냉장쇠고기

Amino acids	Strip Loin			Loin			Loin		
	Hanwoo		Australia	Hanwoo		Australia	Hanwoo	New Zealand	
	1 ⁺	1	Angus	1 ⁺	1	Angus	1 ⁺	1	Angus
Cystein	0.21 ^b ±0.00	0.22 ^a ±0.01	0.23 ^a ±0.00	0.19 ^b ±0.01	0.22 ^a ±0.01	0.23 ^a ±0.00	0.19 ^c ±0.01	0.22 ^b ±0.01	0.24 ^a ±0.01
Methionine	0.46 ^b ±0.00	0.50 ^a ±0.01	0.51 ^a ±0.01	0.40 ^b ±0.01	0.48 ^a ±0.01	0.51 ^a ±0.01	0.40 ^b ±0.01	0.48 ^a ±0.01	0.48 ^a ±0.01
Aspartic acid	1.82 ^b ±0.03	1.86 ^b ±0.06	2.02 ^a ±0.02	1.62 ^c ±0.04	1.78 ^b ±0.07	2.02 ^a ±0.04	1.62 ^b ±0.04	1.78 ^b ±0.07	2.10 ^a ±0.05
Threonine	0.91 ^b ±0.02	0.93 ^b ±0.03	1.02 ^a ±0.01	0.80 ^c ±0.02	0.89 ^b ±0.04	1.02 ^a ±0.02	0.80 ^b ±0.02	0.89 ^b ±0.04	1.07 ^a ±0.03
Serine	0.79 ^b ±0.01)	0.81 ^b ±0.03	0.88 ^a ±0.01	0.72 ^b ±0.02	0.77 ^b ±0.03	0.87 ^a ±0.02	0.72 ^b ±0.02	0.77 ^b ±0.03	0.90 ^a ±0.02
Glutamine	3.03 ^b ±0.05	3.18 ^b ±0.12	3.51 ^a ±0.05	2.76 ^b ±0.08	3.02 ^b ±0.15	3.50 ^a ±0.08	2.76 ^b ±0.08	3.02 ^b ±0.15	3.51 ^a ±0.09
Glycine	0.83 ^b ±0.01	0.89 ^a ±0.03	0.90 ^a ±0.01	0.75 ^b ±0.02	0.84 ^a ±0.02	0.89 ^a ±0.02	0.75 ^c ±0.02	0.84 ^b ±0.02	0.92 ^a ±0.03
Alanine	1.14 ^b ±0.02	1.20 ^b ±0.05	1.27 ^a ±0.01	1.04 ^b ±0.03	1.13 ^b ±0.05	1.27 ^a ±0.03	1.04 ^b ±0.03	1.13 ^b ±0.05	1.31 ^a ±0.05
Valine	0.77 ^c ±0.01	0.84 ^b ±0.02	0.93 ^a 0.01	0.67 ^c ±0.02	0.81 ^b ±0.03	0.90 ^a ±0.02	0.67 ^c ±0.02	0.81 ^b ±0.03	0.93 ^a ±0.04
Leucine	0.69 ^c ±0.01	0.78 ^b ±0.02	0.89 ^a ±0.01	0.60 ^c ±0.02	0.74 ^b ±0.03	0.86 ^a ±0.02	0.60 ^c ±0.02	0.74 ^b ±0.03	0.94 ^a ±0.06
Isoleucine	1.66 ^b ±0.02	1.71 ^b ±0.06	1.86 ^a ±0.01	1.50 ^b ±0.04	1.64 ^b ±0.07	1.85 ^a ±0.04	1.50 ^b ±0.04	1.64 ^b ±0.07	1.98 ^a ±0.08
Tyrosine	0.56 ^b ±0.01	0.53 ^b ±0.03	0.72 ^a ±0.01	0.51 ^b ±0.01	0.51 ^b ±0.02	0.72 ^a ±0.02	0.51 ^b ±0.01	0.51 ^b ±0.02	0.77 ^a ±0.03
Phenyl-alanine	0.72 ^b ±0.02	0.68 ^b ±0.03	0.97 ^a ±0.02	0.67 ^b ±0.02	0.65 ^b ±0.02	1.00 ^a ±0.04	0.67 ^b ±0.02	0.65 ^b ±0.02	1.12 ^a ±0.09
Lysine	1.69 ^b ±0.02	1.76 ^b ±0.05	1.97 ^a ±0.02	1.52 ^c ±0.04	1.69 ^b ±0.06	1.97 ^a ±0.05	1.52 ^b ±0.04	1.69 ^b ±0.06	2.11 ^a ±0.10
Histidine	0.75 ^b ±0.01	0.77 ^b ±0.03	0.83 ^a ±0.01	0.62 ^b ±0.03	0.69 ^b ±0.03	0.80 ^a ±0.02	0.62 ^b ±0.03	0.69 ^b ±0.03	0.98 ^a ±0.06
Arginine	1.12 ^c ±0.01	1.18 ^b ±0.04	1.28 ^a ±0.01	1.02 ^c ±0.02	1.13 ^b ±0.04	1.29 ^a ±0.03	1.02 ^c ±0.02	1.13 ^b ±0.04	1.30 ^a ±0.02
Proline	0.75 ^b ±0.02	0.81 ^{ab} ±0.05	0.88 ^a 0.02	0.72 ±0.02	0.81 ±0.06	0.81 ±0.03	0.72 ^b ±0.02	0.81 ^b ±0.06	0.93 ^a ±0.02

(Cho et al., 1999a)

(Cho et al., 1999b)

아미노산 함
량은 수입산
이 높다.

한우고기와 호주산&뉴질랜드산 냉장쇠고기

Table 4. Mineral contents (mg/kg) of Korean Hanwoo and imported Australian beef

Minerals	Strip Loin			Loin			Top round			Chuck tender		
	Hanwoo		Australia	Hanwoo		Australia	Hanwoo		Australia	Hanwoo		Australia
	1 ⁺	1	Angus	1 ⁺	1	Angus	1 ⁺	1	Angus	1 ⁺	1	Angus
Ca	77.00 ±4.79	66.95 ±3.99	64.85 ±1.27	49.14 ±8.46	66.56 ±5.45	52.62 ±1.33	62.95 ±0.97	63.50 ±3.49	78.57 ±12.07	78.75 ±5.55	77.25 ±8.37	74.69 ±3.81
Fe	26.98 ±2.37	30.52 ±2.71	21.65 ±1.29	27.33 ±3.49	31.29 ±3.70	19.64 ±3.07	37.80 ±1.56	36.38 ±2.07	35.42 ±6.43	27.34 ±2.99	40.70 ±5.86	28.05 ±1.83
Zn	31.98 ±2.22	33.56 ±1.48	28.98 ±0.51	42.94 ±3.80	42.16 ±2.43	41.04 ±6.03	35.87 ^b ±1.24	34.54 ^b ±1.21	45.49 ^a ±3.98	53.20 ±2.58	52.06 ±5.60	56.92 ±3.94

Values are Mean±SE.

^{a,b}Means in the same row within the same category with different letters are significantly different ($p<0.05$).

(Cho et al., 1999a)

Table 4. Ca, Fe, Zn contents(mg/100g) of Korean Hanwoo (quality grade 1⁺ and 1) and imported New Zealand black Angns beef

Minerals (mg/g)	Strip loin			Loin			Eye of round			Chuck tender		
	Hanwoo		New Zealand	Hanwoo		New Zealand	Hanwoo		New Zealand	Hanwoo		New Zealand
	1 ⁺	1		1 ⁺	1		1 ⁺	1		1 ⁺	1	
Ca	77.00 ^{ab} ±4.79	66.95 ^b ±3.99	83.81 ^a ±2.74	49.14 ±8.46	66.56 ±5.45	70.71 ±4.77	62.95 ±0.97	63.54 ±3.49	76.91 ±2.79	78.75 ±5.55	77.25 ±8.37	77.65 ±2.93
Fe	26.98 ^{ab} ±2.37	30.52 ^a ±2.71	21.08 ^b ±2.10	27.33 ±3.49	31.29 ±3.70	21.95 ±1.93	37.80 ±1.56	36.38 ±2.07	30.53 ±1.88	27.34 ^b ±2.99	40.70 ^a ±5.86	22.90 ^b ±2.62
Zn	31.98 ±2.22	33.56 ±1.48	33.46 ±1.80	42.94 ±3.80	42.16 ±2.43	39.03 ±1.37	35.87 ^b ±1.24	34.54 ^b ±1.21	53.91 ^a ±0.15	53.20 ±2.58	52.06 ±5.60	52.16 ±4.24

*Mean±SE

^{a,b}Means in the same row within the same category with different letters are significantly different ($p<0.05$).

(Cho et al., 1999b)

무기물 함량은 비슷함.

호주산 Wagyu쇠고기

Table 3. Sensory panal ratings of *M. Longissimus lumborum* of Hanwoo beef and Australian Wagyu beef

Items	Hanwoo beef ¹⁾			Australian beef (n=16)
	Grade 1 ⁺⁺ (n=27)	Grade 1 ⁺ (n=14)	Grade 1 (n=40)	
Overall like ³⁾	5.13 ^a ± 0.10 ²⁾	4.69 ^b ± 0.12	4.67 ^b ± 0.07	4.66 ^b ± 0.11
Tenderness ⁴⁾	5.28 ^a ± 0.11	4.72 ^b ± 0.13	4.63 ^b ± 0.08	4.88 ^b ± 0.10
Juiciness ⁵⁾	5.22 ^a ± 0.12	4.64 ^b ± 0.13	4.69 ^b ± 0.08	4.85 ^b ± 0.10
Flavor ⁶⁾	4.89 ^a ± 0.08	4.72 ^a ± 0.09	4.70 ^a ± 0.06	4.24 ^b ± 0.12

¹⁾Quality grade of Korean carcass grading system (Grade 1⁺⁺, Grade 1⁺, Grade 1, Grade 2, Grade 3).

²⁾Mean ± SE.

³⁾Overall like : 6, like extremely; 1, dislike extremely.

⁴⁾Tenderness : 6, very tender; 1, not tender at all.

⁵⁾Juiciness: 6, very juicy; 1, not at all juicy.

⁶⁾Flavor: 6, like extremely; 1, dislike extremely.

^{a-d)}Means in the row with different letters are significantly different ($p < 0.05$).

미국산&호주산 냉동쇠고기

Table 6. Descriptive analysis with scaling¹ of two imported frozen beef loins and Han-woo loins(cooked meat)

	Aroma	Flavor	Off-flavor	Color	Juiciness	Tenderness	Acceptability
Han-woo	4.67 ± 2.06	6.00 ± 1.32	2.33 ± 1.22	5.11 ± 1.54	4.44 ± 2.50	5.78 ± 2.22	5.78 ± 1.99
American	4.67 ± 2.06	5.78 ± 0.83	3.22 ± 1.86	4.56 ± 1.51	4.11 ± 1.90	6.22 ± 1.39	5.44 ± 2.13
Austalian	5.56 ± 2.55	6.22 ± 0.97	2.78 ± 1.86	5.78 ± 1.48	4.11 ± 1.53	5.44 ± 1.59	5.33 ± 1.22

¹ Sensory scores were assessed on 10 point hedonic scale where 1 = extremely bad of slight, 10 = extremely good or much.

^{a, b, c} Means ± SD with different superscripts in the same column differ significantly.

* : $p < 0.05$.

미국산&호주산 냉장쇠고기

Table 6. Descriptive analysis with scaling of chilled two imported beef loins and Han-woo loins(Cooked meat)

	Aroma	Flavor	Off-flavor	Color	Juiciness*	Tenderness*	Acceptability
Han-woo	4.56±1.81	5.56±1.59	2.00±1.22	5.89±1.62	4.22±1.79 ^d	5.78±2.28 ^{ab}	5.67±2.29
American	5.44±2.30	6.44±2.13	3.78±2.59	4.33±1.58	5.67±1.22 ^a	7.22±0.83 ^a	5.00±2.00
Australian	3.44±1.51	4.33±2.06	2.44±1.01	5.89±2.32	3.67±1.22 ^b	5.00±1.73 ^b	4.56±1.37

¹ Sensory scores were assessed on 9 point hedonic scale where 1=extremely bad or slight, 9=extremely good or much.

^{a,b,c} Means±SE with different superscripts in the same row are significantly different.

* : P<0.05

한우고기에서 3배 이상 검출되는 향미성분

등심부위 : hexanal, heptanal, octanal, E-2-octenal, nonenal, E-2-decenal, E,E,2,4-decadienal, 2-undecenal, heptane, 2-butyl furan

홍두깨 부위 : pentanal, hexanal, heptanal, benzaldehyde, octanal, nonanal, E-2-decenal, octadecanal, 2-furan methanol, 2-pentyl furan

미생물 오염

한우고기

Campylobacter jejuni & *Campylobacter coli*

Table 3. Prevalence of *Campylobacter jejuni* and *Campylobacter coli* in domestic meat samples in Korea, 2005~2009

Type of meat	Species of <i>Campylobacter</i>	No. of positive samples/No of total samples (%)					Total (%)
		2005	2006	2007	2008	2009	
Beef	<i>C. jejuni</i>	0/103 (0)	1/130 (0.8)	0/127 (0)	0/140 (0)	0/130 (0)	1/630 (0.1)
	<i>C. coli</i>	0/103 (0)	0/130 (0)	0/127 (0)	0/140 (0)	0/130 (0)	0/630 (0)

수입산(미국, 호주, 뉴질랜드, 멕시코)

Table 4. Prevalence of *Campylobacter jejuni* and *Campylobacter coli* in imported meat samples in Korea, 2005~2009

Type of meat	Species of <i>Campylobacter</i>	No. of positive sample/No of total samples (%)					Total (%)
		2005	2006	2007	2008	2009	
Beef	<i>C. jejuni</i>	0/158 (0)	0/159 (0)	0/109 (0)	0/144 (0)	0/141 (0)	0/711 (0)
	<i>C. coli</i>	0/158 (0)	0/159 (0)	0/109 (0)	0/144 (0)	0/141 (0)	0/711 (0)

(Park et al., 2010)

미생물 오염

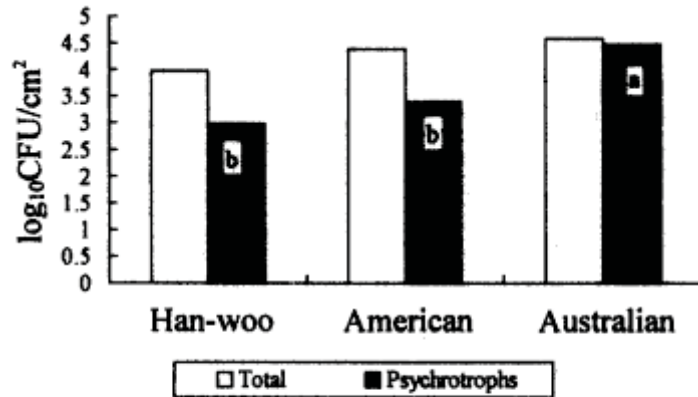


Fig. 1. The level of total aerobic bacteria and psychrotrophic bacteria of two imported frozen beef loins and Han-woo loins

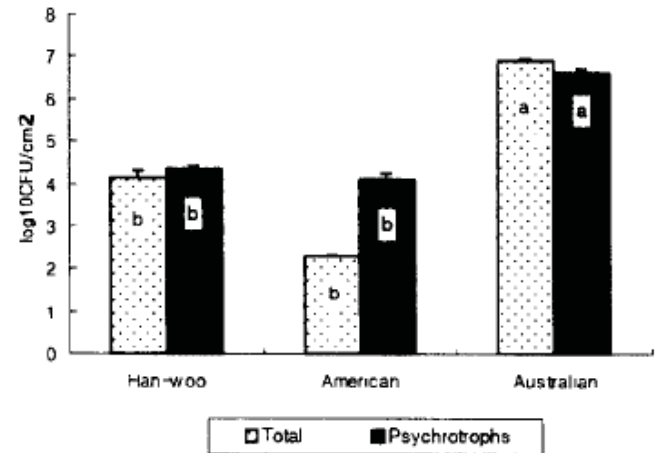


Fig. 1. The level of total aerobic bacteria and psychrotrophs bacteria of chilled two imported beef loins and Han-woo loins.

(Kim et al., 1999a; 2000)

TBA & VBN

Table 2. TBA and VBN values of two imported frozen beef loins and Han-woo loins

	TBA (mgMA/kg)	VBN(mg%)***
Han-woo	0.34 ± 0.29	9.80 ± 1.42^a
American	0.22 ± 0.17	11.85 ± 2.56^b
Australian	0.39 ± 0.04	19.42 ± 2.41^c

^{a, b, c} Mean \pm SD with different superscripts in the same column differ significantly.

*** : $p < 0.001$.

Table 2. TBA and VBN values of chilled two imported beef loins and Han-woo loins

	TBA (mgMA/kg)**	VBN (mg%)***
Han-woo	0.20 ± 0.069^b	19.44 ± 5.60^b
American	0.35 ± 0.09^a	15.33 ± 0.70^c
Australian	0.11 ± 0.15^b	33.46 ± 4.21^a

^{a,b,c} Means \pm SD with different superscript in the same column differ significantly.

** : $P < 0.01$, *** : $P < 0.001$

(Kim et al., 1999a; 2000)

5. 결 론

수 입 현 황

- 수입산 쇠고기는 국내 소고기 소비량의 56.8%(245,086톤)를 차지함.
- 수입산 쇠고기의 82.8%가 냉동육으로 수입됨.
- 호주(49.7%), 미국(37.0%), 뉴질랜드(12.6%), 멕시코(0.7%) 순으로 수입됨.

품질 특성 비교

- 한우의 육질등급에 따라 차이는 있으나 보통 한우고기가 지방함량이 높은 반면 단백질 함량은 수입산 쇠고기가 높음.
- 보수력, 연도 및 육색은 큰 차이가 없음.
- 지방산 조성은 특히 palmitoleic acid, oleic acid 및 MUFA가 한우고기에 많이 함유되어 있음.
- 아미노산 조성은 수입산 쇠고기가 대부분의 항목에서 높은 함량을 보임.
- 관능적 특성에서는 큰 차이가 없었으나, 한우고기가 수입산 소고기보다 hexanal, heptanal, octanal, E-2-octenal 및 nonenal 등의 향미 성분이 3배 이상 많이 함유하고 있음.
- 미생물, TBA 및 VBN에서 한우고기가 상대적으로 안전한 수준이고, 식중독균인 *Campylobacter jejuni* 및 *Campylobacter coli*에는 모두 안전한 수준을 나타냄.