

# *History and Language of International Meat Cutting*

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Patterns of meat cutting differ between most countries and even within different regions of some countries, and must be taken into account when we trade meat internationally. Historical differences are compounded by differences in spoken languages and ways of writing to produce a complex technological matrix, but all based on the relatively uniform anatomy of our meat animals. Cutting patterns are a key part of meat consumption culture—a subject which is fundamental to meat marketing, technology, and science. This lecture explores how US meat cutting may have evolved historically and linguistically, and gives an overview of how patterns of meat cutting in the United States relate to those used at export destinations.

## **INTRODUCTION**

Receiving the AMSA International Lectureship Award was a totally unexpected honor, and a great opportunity to promote international meat consumption culture (Nam et al., 2010; Swatland, 2010a) in the curriculum for meat science students. Why? Because meat consumption culture justifies our existence as meat scientists, as well as suggesting creative ways for market development, both domestically and internationally. Our remote ancestors ate meat, and so do most of us now; meat has been around for the whole of our history—this is a dominant theme in advertising meat products and combating anti-meat propaganda. Patterns of meat cutting and terminology may differ from country to country, but in this great complexity we can find traces of history and the development of language—from the ancient world to a supermarket near you. Consumption culture may be just a trendy name for something we all take for granted, but once we adopt a scholarly approach to a subject, we greatly improve our understanding of what we know, and what we do not know. What we know is how we cut meat in each of our countries—but this knowledge is seldom shared between countries; the sum of the knowledge exists, but is almost

inaccessible. What we do not know is how meat cutting evolved in each country; as we see below, the scarcity of documentation is our main problem.

## **ON THE SCARCITY OF DOCUMENTATION**

There is abundant evidence of a well-developed meat industry in ancient Egypt, involving both abattoir technology and meat processing appropriate to the requirements of meat preservation in a hot climate (Ikram, 2000). Scenes such as those in Figure 1 are quite common in archeological sites along the River Nile, but there is minimal variation over very long periods of time, which suggests that these scenes were symbolic and represented divine offerings rather than everyday life (Smith, 2010). By the time of ancient Greece and Rome, however, all the props of the butcher's trade had become established for the sale of meat to the general public (Swatland, 2011b); although, even here, the evidence may be suspicious. Scenes on butchers' grave markers are the best evidence, but one famous bas-relief of a Roman butcher's shop (which copyright prevents me from showing) has been attributed to both the Dresden Museum in Germany (Rixson, 2000) and to the Roman Palace, Fishbourne, in England (Dunning, 1985). More symbolic copying, or just scholarly error? This emphasizes that we are trying to understand the history of meat cutting from just a few chance scenes that have been preserved; unfortunately, we still have the same problem today. Meat cutting in the United States is highly standardized and fully documented, but the documentation is not much older than AMSA itself: what was it like in 1776? In Europe, traditional patterns of meat cutting and the names of meat cuts are disappearing right now as the EEC countries standardize their trading linkages like interstate commerce in the United States.

## **ORIGIN OF US BEEF CUTS**

From first principles of history and a shared language, one would assume US beef cuts originated from Britain, but US and British beef cuts are now radically different; thus, we must study the differences and gather some proof of our assumption. Let us ignore small anatomical differences in how the cuts are made, and look only at the names for the primal cuts (Table 1). The cutting charts used are

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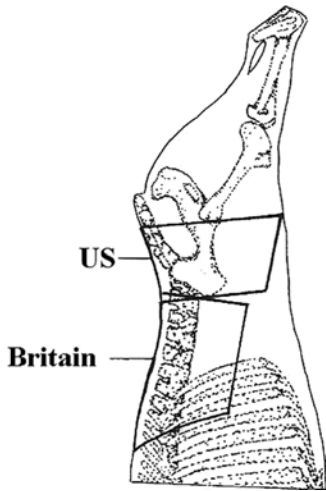


**Figure 1.** A scene of beef slaughter and cutting in the mastaba (rectangular, flat-roofed tomb) of Princess Idut, who died around 2330 BC (Saqqara, Egypt, 2012).

those shown by Swatland (2004, Figures 57 – 64, 66, and 229). If a US cut overlapped with a British cut of the same name, it scored 1, with 0 for a mismatch by location. In Table 1, the cut match shows the degree of concordance; rib and brisket are perfectly conserved names, with flank not far behind. There is no concordance for shank, but this simply may be a difference in English usage; if we substitute shin for shank, the score is a perfect 10. Look at the chronological sequence from A and B, to C (from years 1816 and 1876, to 2000). The declining source match (5, 3, 2) might be due to chance, but also it may be showing the divergence with time between the United States and Britain. Table 1 also shows a few suggestions for the origins of the names of US beef cuts; however, there are numerous other possibilities.

In Table 1, why the low cut match for the plate? Is this an American invention? Probably not, because the plate also occurs in Irish beef cutting and there was no shortage of Irish immigrants to the United States, which may ex-

plain its prevalence in the United States. But why the zero cut match for the US sirloin? The explanation is complex because sirloin is derived from surlonge, which means on or above the loin, and these terms depend on how you are looking at an animal or carcass. A British sirloin contains lumbar and posterior thoracic vertebrae and straddles the loin and rib cuts, so on or above means anterior in both Britain and France (where the surlonge is set far forward medial and dorsal to the scapula). However, in the United States the sirloin is posterior to the loin, so on or above means posterior in the US (Figure 2). Australia is similar to the United States in placing the sirloin posteriorly level with the ilium (but the sirloin also may be called a rump in Australia). In North American beef cutting (Canada follows the US pattern), the delineation of a sirloin usually is made by 2 almost horizontal planes in the hanging carcass. The upper or posterior plane touches the anterior, proximal tip of the femur while the lower plane touches the anterior face of the ilium, as shown in Figure 2; this primal cut also may be called a short hip. In Britain, a



**Figure 2.** Location of the sirloin in the United States and Britain.

**Table 1.** Matching names for primal beef cuts in the United States compared with geographical sources in Britain: (A) England, 1816; (B) England, 1876; (C) England, 2000; (D) West of England; (E) Liverpool, (F) Northeast England; (G) Manchester; (H) English Midlands; (I) London; and (J) Edinburgh; plus possible word origins

United States	A	B	C	D	E	F	G	H	I	J	Cut match	Archaic	Possible origin
Sirloin	0	0	0	0	0	0	0	0	0	0	0	Surloine	Surlonge (Old French)
Loin	1	0	0	0	0	0	0	0	1	0	2	Loyne	Lumbus (Latin)
Rib	1	1	1	1	1	1	1	1	1	1	10	Ribb	Rif (Norse)
Chuck	1	0	0	1	0	0	0	1	1	0	4	Chock	Çoche (Old French)
Round	0	1	0	0	1	1	0	0	0	1	4	Rounde	Rotundus (Latin)
Flank	1	0	0	1	1	1	1	1	1	1	8	Flanc	Hlanke (Frankish)
Plate	0	0	0	0	0	1	0	0	0	0	1	Plater	Platus (Greek)
Brisket	1	1	1	1	1	1	1	1	1	1	10	Brusket	Brjósk (Norse)
Shank	0	0	0	0	0	0	0	0	0	0	0	Sceanca	Schenken (German)
Source match	5	3	2	4	4	5	3	4	5	4			

sirloin usually extends from the ilium to the last few ribs, and sometimes this sirloin is called a loin. In summary, after the sirloin was exported from Britain and France, it somehow changed position with the loin to give a zero cut match in Table 1. Perhaps the naming of meat cuts originated with animals lying on a kill floor, as in Figure 1, but changed once animals were hoisted off the floor, as in Figure 2? The answer may be hidden in old farm-meats books stored in your university library (note the challenge to students in this audience). As the sirloin differs, so does the rump (Figure 3).

## LINGUISTIC SURVIVAL

We have just sampled some of the mysteries of transatlantic communication; how about a different approach—sampling the survival of an obscure name? In the early years of the International Scientific Series, important books which were published almost simultaneously in both London and New York with a tremendous influence on international science communication (Swatland, 2010b), the third volume in the series was by Edward Smith (1819–1874), a British physician with personal transatlantic connections via his American wife. In his day he may not have been properly appreciated, but his final contribution is remarkable; perhaps the first textbook of food science in the English language based on biochemistry and physiology. Smith (1876) was the first to consider the gaseous content and exposure of foods, thus establishing the scientific foundation of modern meat packaging, but he also included a meat cutting chart identifying a strange beef cut—the spaud (Figure 4).

The spaud included the triceps brachii and the scapula. The name was maintained through Middle English and Old French, through spauld, espalde, and espauale, and it links the modern French, *épaule*, to the original Latin, *spatulae*, for the shoulder blades. Today in Italy, there are cuts through the shoulder of the beef carcass with names such as *taglio di sottospalla* (cut from the under-shoulder) and *sezione e muscolo di spalla* (section of shoulder muscle); and in Spain, the shoulder of a beef carcass is called the *espalda*. There was a linguistic transformation from scapula (shoulder blade) to spatula, via spatha (a double-edged broad sword). *Espaldilla* is Spanish for the scapula, and a cut of this name may be found on a Mexican pork carcass, involving the distal part of the forelimb. The pork *espaldilla y codillo* includes the ventral neck and jowl; and, in a Mexican lamb carcass, the *espaldilla* is a large primal cut or a small shoulder roast, in veal as well as lamb. The scapula was used as a digging tool in Neolithic times (Tarrús, 2008), and you probably have a spatula in your own kitchen. What a remarkable linguistic survival!

Although we have very little information on the historical development of meat cuts in anatomical terms, we can see from Table 1 that linguistic survival offers an indirect source of information, but words can also fade away. The English language has proved remarkably useful in adapting to evolving technology and to the geographical

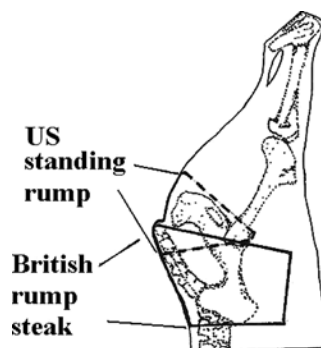


Figure 3. Location of the rump in the United States and Britain.

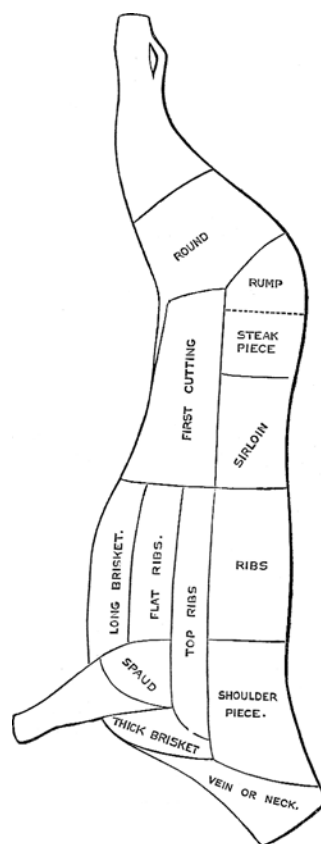


Figure 4. The spaud in a cutting chart from an old book by Smith (1876).

migrations of its speakers, but it lacks the advantage of German in concatenating words; take a familiar example – *Fleischwirtschaft*. English lacks words which might help us communicate ideas relating to the meat industry, such as a single term for the edible muscles of all animals. We had to invent a new one—*myosystems*—just as we had to invent muscle biology. Sadly, we have lost a real English name that might have been very useful. The English word *laniary* is derived from the Latin, *macellarius*, for a butcher or slaughter house; thus, this whole lecture is *laniary* in nature. An important date in the development

of laniary language was 1066, when the Normans conquered Saxon England—which had few words to denote different types of meat. The Normans introduced boeuf, mouton, and porc which became beef, mutton, and pork. From old French we can follow bochier, through boucher, to butcher (Dunning, 1985). But the separation of names for live animals and the meat derived from them took about 700 years to become established (Burchfield, 1985), although the separation is still incomplete. For example, most Americans will say pigs produce pork, while our economists still tabulate pigmeat production. Butchers in the depths of the English countryside might still talk of buying beeves, using the plural of beef to denote the living animal. Even more ancient is the wild aurochs, *Bos primigenius*, the ancestor of the domestic ox, with unusual matching plural forms, aurochsen and oxen. To conclude this brief foray into laniary language, take note of the possibility that meat and language may have a far more ancient relationship than is generally realized; it is quite possible that human language first evolved in the distribution of meat from hunting (Bickerton, 2009).

### HANDSAW VERSUS BANDSAW

Some of us learned meat cutting with a handsaw and a knife, either in small shops or on the farm, and we know the advantages of curvilinear cutting—moving slices of meat from low-priced to high-priced cuts with elegant curves! But on a large scale, running slabs of meat through a bandsaw is the most efficient method. Thus, when we look at the multitude of international meat cuts we see curved lines for small-scale operations, and straight lines

for large-scale operations. In Argentina, for example, there are 2 patterns of beef cutting based on the use of a bandsaw versus a handsaw (Figure 5).

So who invented the bandsaw and laid the foundation for the dominant patterns of meat cutting in the United States? In 1813, Tabitha Babbitt (1784–1853) invented the circular saw in Massachusetts; bandsaws were developed a little later, but were not successful until 1846 when Anne Pauline Crépin in France invented a method to weld the ends of the band securely (Duginske, 1989). About this time, rolled spring-steel became available, and band saws appeared in the meat industry. Thus, the mechanical brilliance of 2 women has shaped the whole of US meat cutting using bandsaws! But, is this the end of the story?

### BONE-IN VERSUS BONELESS

If we look at the cut match for the round in Table 1, we see quite a low score, 4, and there is a reason for this. In a traditional British butcher's shop, sides of beef were quartered and laid on a block for cutting by hand. In the hindquarter, the US round is more or less the same as the British top piece (meat around the ischium, femur, and tibia). But, as with the sirloin, what is meant by top? If a whole British top piece or hip of beef is dropped onto a cutting block, it is convenient to drop it with the lateral surface downwards onto the block, thus leaving the medial surface with the aitch bone (pubis) and chine bone (vertebrae) exposed as landmarks for cutting. Hence, the medial surface of the hip defines the English topside; quite literally, it is on top, and the semimembranosus located

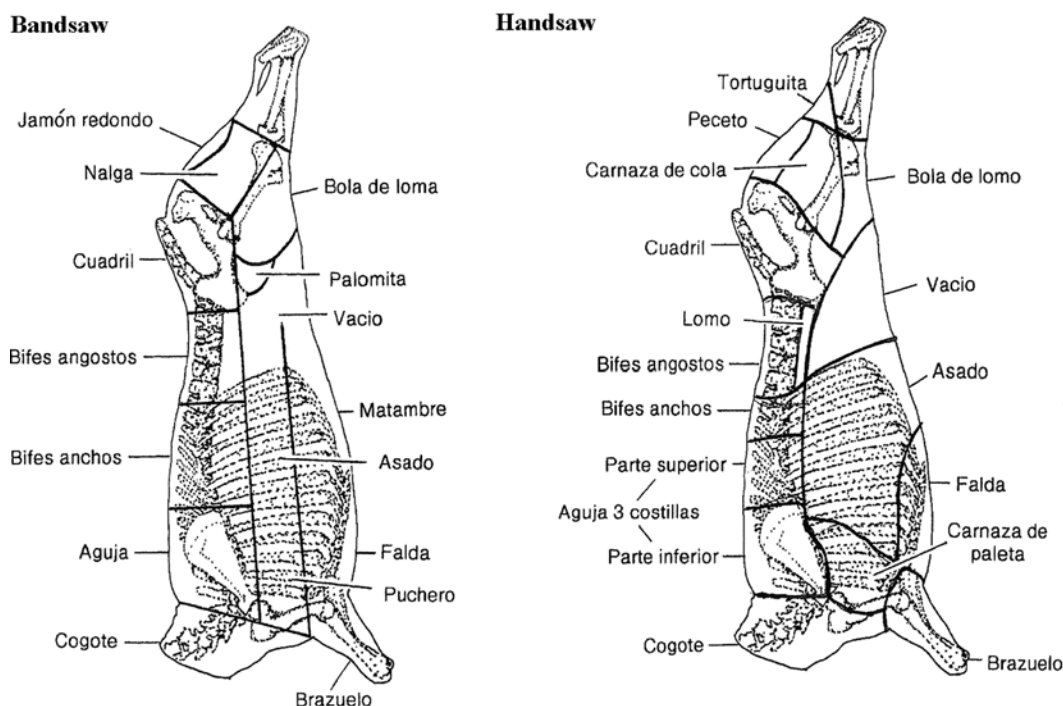


Figure 5. Two patterns of beef cutting in Argentina.

medially in the hip is, therefore, part of the topside. Conversely, the semitendinosus (eye of the round in the United States) is located laterally in the hip and has a natural, silvery seam of epimysium along which to define the start of the English silverside, which is lateral in position. Thus, the topside is medial to the silverside in England, just as the inside round is medial to the outside round in the United States. Instead of cutting the round into slices perpendicular to the femur, a British butcher may remove whole muscles longitudinally parallel to the femur; the muscles will be rolled and tied in a flat sheet of beaten fat. Long rolls then will be cut transversely to match consumer requirements. The trend to rolled individual muscles is even greater in France, where very little beef is sold bone-in; on one hand, the labor cost is high, on the other hand, the consumer is getting individual muscles with a constant flavor-tenderness profile.

Recent developments in the United States to produce boneless, value-added beef cuts are, therefore, following a well known international trend, but why did this happen earlier in Europe? This is a question for the economist to answer because it must surely involve the balance of labor cost versus value-added advantage, both of which may be correlated with meat cost as a fraction of disposable income. Other more subtle factors also may be involved, as in Japanese meat cutting, where boneless cuts dominate because bone and any sight of pork rind are unattractive to consumers: what is attractive as marbling may be repellent intermuscularly or subcutaneously. Exporting value-added cuts might be relatively simple in the Caribbean, which has long been using a similar system (Table 2), offering new possibilities such as the mariposa (a butterfly-shaped cut of pelvic muscles including obturatorius internus and externus). This brings us to our final topic—a lexicon.

A LEXICON FOR US MEAT EXPORTS

A complete coverage of international meat cutting would tie up the whole of this RMC and put everyone to sleep, but a brief synopsis of major points is appropriate. Canada is a major customer of the United States, but uses the same cutting pattern; hence, the emphasis here is on other

Table 2. Some US value-added cuts and their Caribbean equivalents

US	Anatomy	Caribbean
Santa Fe	Gracilis	Cañada
San Antonio	Adductor	Cañada
Round Petite Tender	Pectineus	Cañada
Tucson	Semimembranosus	Cañada
Braison	Superficial digital flexor	Cohete
Merlot	Gastrocnemius	Sapo
Western griller	Biceps femoris	Pierna
Western tip	Distal biceps femoris	Pierna
Ranch steak	Triceps brachii	Yema de paleta
Delmonico	Longissimus dorsi, multifidus dorsi, spinalis dorsi and complexus	Filetillo
Denver	Serratus ventralis	Falda de morrillo o tapa de cogote

currently important destinations for US meat—Mexico, Korea, and Japan (Tables 3 and 4). Obviously, market development is an ongoing activity subject to the uncertainties of global economics; other destinations might soon become important, so some speculative possibilities are added as well (Table 5; Russia, 82% increase to 48 k metric tons; Netherlands, 27% to 15 k; Chile, 166% to 4 k; USMEF, 2012, data for Dec 2011). China is of growing importance, but US primal cuts are accepted, and transliteration is neither simple nor particularly useful. The tables show the international names for primal cuts with a major overlap with the US cuts, which, as one would expect, seldom share identical outlines; reference to the source material may help (Swatland, 2004).

LOOKING FORWARD

When I was planning my book on international meat cuts (Swatland, 2000) with Ralston Lawrie as my advocate at Nottingham University Press, we knew that only an international committee could hope for a complete and accurate coverage; but I proceeded alone, arguing that the time taken by a committee to reach completion would

Table 3. Corresponding primal cuts in major importing countries for US beef

US	Mexico	Japan	Korea
Sirloin	Cadera	Ranichi	Suldo, anterior
Loin	Lomo, posterior	Roin	Chaekeut
Rib	Lomo, anterior	Riburoosu	Dungsim
Chuck	Espaldilla y costillar	Kataroosu + nekku	Abdari + Moksim
Round, hip	Pierna	Sotomomo, lateral + Uchimomo, medial	Suldo, posterior + udun
Flank	Pecho, posterior	Shintama	Yangjee
Plate	Pecho, anterior	Tomobara	Kalbi, dorsal
Brisket	Tapa de pecho	Katabara	Kalbi, ventral
Shank	Chambarete	Sune	Satae

**Table 4.** Corresponding primal cuts in major importing countries for US pork

United States	Mexico	Japan	Korea
Loin	Lomo	Roosu	Dungsim
Shoulder	Cabeza de lomo	Kata + Ude	Abdari, Kalbi + Moksimsim
Foot, hind	Chamorro	Momo, distal	—
Leg or ham	Pierna	Momo	Deukari
Belly	Pecho	Bara	Samkeubsal
Foot, fore	Espaldilla	Ude, distal	—

be proportional to the square of the number of people involved—with 50 countries, the book would not yet have been printed. But all this happened many years ago; since then, the internet and websites have become the dominant medium for information exchange. Thus, I think now is the time to dump the contents of my book into a Wikipedia type of website, check the content, improve the graphics, and let it develop as a community effort. I am not so sure it should be a public effort—some members of the general public have some strange views about meat cutting, while a minority are downright hostile. Thus, a secure server and a responsible committee of contributors and reviewers would produce the best result.

As well as the obvious problems in international trading, the complexity of international meat cutting also has been a barrier to communication among meat scientists. For example, one of the first and certainly the most translated meat science textbook was Lawrie’s Meat Science (Lawrie, 1966); this contained a chart for English beef cutting which was inapplicable nearly everywhere the book was used, even in England (note the geographical cutting variation in Table 1). Similarly, the content of Ziegler’s The Meat We Eat (Ziegler, 1966) was inapplicable outside the United States. The international meat science community found a way around this problem by adopting muscle names as the basis for communication; the breakthrough publication making veterinary anatomy accessible to meat scientists was Tucker, Voegeli, and Wellington’s A Cross-sectional Muscle Nomenclature of the Beef Carcass

(Tucker et al., 1952). But the problem is still with us. In the international journal Meat Science, we still have otherwise erudite and worthwhile research papers based on meat from anonymous sources; this contravenes one of the basic rules of science publishing—that the information in a paper should enable another researcher to duplicate exactly the experiment reported. From my editorial experiences in trying to combat this anonymous meat problem, the root cause is almost always that the authors do not know the name of their source meat cut and, hence, cannot identify the muscles contained in it. Faced with the baffling complexity of international meat cutting, many of our colleagues in other countries appear to have reverted to a belief that all meat from one species is a homogenous material – something not a single person in this audience would believe. Thus, if we could make international meat cutting more easily accessible, we might make a breakthrough with the anonymous meat problem, which is an embarrassment to our profession as meat scientists. Do you really think you could publish a paper in a geology journal if you forgot where you found your rocks?

Finally, on a personal note, I hope this brief sampling of international meat cutting has served to advance consumption culture as an important topic within the meat science curriculum. Much of the work of meat exporting organisations such as the US Meat Export Federation involves consumption culture: first, find what customers want and how they will cook it; and, second, ask meat scientists how to source the meat and process it. Similarly, consumption culture is a key part of my own research program aimed at developing new technology for predicting meat quality, and it is very gratifying to find my emeritus research work in both areas now being given serious international attention (Swatland, 2011a, 2011b). In retirement, funding for speculative ideas is my main problem, and the prize money for this lecture will be put to good use. As a meat scientist, I am concerned with the looming problem of global warming and the likely reduction of meat-producing lands, and I wish to contribute to the solution. Thus, I am working on the overall carbon cycle relative to groundwater (Swatland, 2012b) and natural mechanisms for carbonate deposition (Swatland, 2010c).

**Table 5.** Corresponding primal cuts in importing countries with a speculative growth potential for US beef

United States	Russia	Netherlands	Chile
Sirloin	Tazobedrennaya, proximal	Dikke lende	Punta de ganso + Asiento
Loin	Poyasnichnaya	Dunne lende met haas	Lomo liso
Rib	Spinnaya	Fijne + dikke rib	Lomo vetado
Chuck	Scheynaya + Lopatochnaya	Schouder	Chocllillo + paleta
Round, hip	Tazobedrennaya, distal	Stomp	Pollo ganso, posta negra + posta rosado
Flank	Paschina	Vang	Palanca
Plate	Groudinka, posterior	Naborst	Coludas
Brisket	Groudinka, anterior	Borst	Tapapecho
Shank	Golyashka	Voorschenkel	Osobuco de mano



And, if the climate really does change very rapidly, I am looking at meat production in animals that can tolerate heat and drought, hence my research on camel meat (Swatland, 2012a).

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