

## 12. Wool

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During the spring of 2022, there was much commotion in the Netherlands about the vast quantity of Dutch wool that was being thrown away. Anger about the wasting of wool led to a march in the former wool city of Tilburg. It was also a topic at the Dutch Design Week in Eindhoven later that year.

In this chapter, I argue that the wasting of wool was mistakenly attributed to the emergence of fast fashion and/or to the shift of manufacturing to China; and that the debate, both in the media and amongst academics, demonstrated a disregard for the materiality of wool. Indeed, the main reason why wool is discarded in many European countries is because breeders chose quality of meat over quality of wool. Wool is defined by its fiber length, its fineness, and its strength. These three variables determine the value (and hence the price) of the fibers. Wool is a long fiber, between five and nine centimeters. The longer fiber gives less pilling and greater longevity. Wool has a fineness between fifteen and forty microns ( $\mu\text{m}$ ) and higher quality wool fabrics (measured in  $\text{gr/m}$ ) require fibers below twenty microns. Fibers above thirty microns are only usable as filling material or in the production of carpets. Additionally, whereas in the 1960s, the majority of suits were made using fabrics of 500 $\text{gr/m}$  with fibers over twenty-five microns, the current standard for suit fabric is approximately 240 $\text{gr/m}$  and fibers below twenty microns (Scheffer, *Trading Places* 113). The dominant Dutch sheep breed, Texels, produces the coarser wool qualities, whereas finer qualities require Merino sheep (the meat of which is considered less tasty) as mainly held in Australia.

Coarse wool itches, as some people may remember from the post-World War II years, especially garments made from used blankets. However, coarse wool was not always discarded. In 1970, it represented forty percent of world wool production and was used in blankets, felts, coarser knitwear, coats, and carpets (Burllet). More recently, however, the demand for coarser qualities has dropped. For example, hardly anyone carries a blanket in their car anymore now that cars are well heated and break down less frequently, thus no longer leaving people literally out in the cold. Similarly, in their centrally heated homes, people today sleep under duvets instead of blankets; and better heating and insulation have made the wearing of thick, heavy knitwear largely superfluous. Coats are more often made from synthetic fibers, for a more ca-

sual or sporty look. Wool carpets are a luxury, and most often replaced by cheaper, stronger, and fireproof polyamide carpets, or by hard floors.

Above all, the debate on wasted wool revealed the conflict between the visual representation of fashion and the materiality of textiles. The simple reason why wool is discarded is because it is technically no longer suitable for textile use. Wool from sheep kept for meat or milk production is too coarse to be used in the manufacture of clothing. Some coarse wools can be used in the production of tweed fabrics, however, the demand for such fabrics, especially for jackets, is rather limited, as it has a very specific aesthetic and function. Tweed may be the fabric of choice for the landed gentry, especially in a hunting context, but it is much less suited to everyday use in centrally heated offices. However, the perception of value associated with tweed is only partly a consequence of representation (the landed gentry at the weekend); it is also the result of material factors, such as the properties of wool and its material processing.

## Understanding the Material Characteristics of Wool

The limitations of using all kinds of wool can only be understood from grasping the material characteristics of wool. Wool comes in different fineness and length. It is sheared mainly from sheep and goats, and for some very fine qualities, from rabbits and llamas. Some animals are specifically bred for wool. Goats are kept for cashmere and mohair, llamas for alpaca and vicuña. These animals produce very long and fine hairs to be used in luxury menswear. The Merino sheep in Australia produces wool that can be used in most quality apparel. All of the animals named above are farmed for their wool, with shearing done yearly during their lives. Meat is in effect merely a by-product. In contrast, in Europe, sheep are mainly kept for their meat, their milk and wool constituting by-products. Wool from these animals is used as filling material for mattresses, duvets, and cushions, however, as production exceeds demand, most of the wool produced is now thrown away.

Wool processing is labor and resource intensive (Burllet) and shearing needs to be done by experts. Furthermore, the wool has to be graded by quality as different parts of the animal's body produce different qualities of wool. These tops are then cleaned of fats and dirt (grass, mud, and feces) by combing, washing, and carbonizing them. Depending on the fiber type, the wool then needs to be combed (to select the longer fibers) and/or carded (to disentangle and mix the fibers into a web or so-called sliver). The resulting fiber is then ready to be roved, spun, twinned, woven, or knitted, and to be dyed and finished to make a softer fabric. Wool is spun in so-called long frames (compared to short frames for cotton). The weaving process must be done at lower speeds than for cotton or synthetic fibers, which further increases the price of wool products, in addition to which the finishing of wool fab-

rics is also more complex than for cotton. Wool textiles, because of their complexity and the interlinkages of the different production sequences, were preferably made in vertically integrated mills or in districts of firms covering the whole supply chain.

The seasonal character of wool, the complexity of manufacturing, and its high cost make wool unsuitable for fast fashion. As a result, wool is mainly used for men's suits, high-end knitwear, and luxury carpets. Today, wool represents only one percent of the world's fiber use, compared to twenty percent before WWI. So, it has become a rather a niche product with its own dynamics, less exposed to mass market trends than other fibers, such as cotton. Wool is expensive: some five to ten times more expensive than cotton or polyester (Harmsen), which together now represent eighty-five percent of the fibers used in textile production. Fast fashion relies much better on cotton, polyester, or viscose fabrics, which can be printed or embroidered.

Wool production conforms to a specific pattern of globalization. Although China is now a major player in all stages of wool production, Italy is still the leading producer of high-end woolen and worsted products. Europe still leads the world in the manufacture of tailored clothing: Biella concentrates the top end of fine worsteds, combed wool yarns, and fabrics whereas Prato is a leader in the processing of regenerated wool: discarded garments (often made from Biella fabrics) that are recycled for yarns for knitwear or for coarser fabrics for coats or tweed-type fabrics. No other large wool districts have survived in the EU, although single isolated firms exist, and there is a revival of small-scale wool craft initiatives in many EU countries.

The reduction in the micronage and weight per meter of fabrics has been made possible by the breeding of sheep toward finer fleeces, better selection and grading of woolen tops, and better combing and spinning methods. Wool has thus become a luxury product and no longer a necessary means of surviving poorly heated houses and outdoor cold. In the 1990s, wool came to be considered mainly from an aesthetic visual perspective, with increased interest in the meaning of fabric patterns (also called “weaves”) such as pied-de-poule, Prince de Galles, herringbones, and caviar. Often blended with silk or, more cheaply, with polyamide, wool represented an immaterial lightness of being—further enabled, for example, by Giorgio Armani's skill to drape and structure jackets with minimal lining and interlining. The visual effect is thus double: the weave or pattern that enhances a three-dimensional look, and the drape, either close to the body or enabling a wave effect (Scheffer, “Fashion Design”).

With the emergent focus on sustainability, the material itself is making a comeback, demanding a better understanding of the intricacies of sheep and shearing, and of the various merits of carding and combing. While the wool industry has almost disappeared from cities that previously formed the backbone of the industrial revolution—cities such as Aachen, Roubaix, Bradford, and Tilburg (Scheffer, *Fatal Clusters*)—there are dreams of, and policies for, strategic autonomy (as presented in the EU textile strategy in 2022) in Europe that are symbolized by the Merino sheep of the Camargue, the tweed weavers of the Hebrides, and numerous local artisanal ini-

tatives from the outskirts of Amsterdam to the Lüneburger Heide, and from Grasse to Catalunya. All of the above, however, must first overcome the fact that we have lost a thorough understanding of the materiality of wool and of the physical and chemical processes needed to obtain an acceptable product. Terms such as sheering, scouring, carding, combing, warp, weft, gauges, singeing, and selvages have all but disappeared and are better known in a figurative rather than literal sense. In order to rebuild value chains, their literal meanings and material effects need to be grasped.

## Understanding Materials to Understand Culture

As Anneke Smelik argues in an article on polyester, we have to understand the materiality of our products to understand cultural change. Fashion derives its significance and its impact from the transformation of the human imagination into images and texts. In an era of supposed abundance and ephemerality, almost everything seemed possible. Indeed, after the liberalization of the textile trade in 2005, a vast choice of materials, the abundance of cheap labor in Asia, and pockets of skills in Europe provided a palette of materials that could form the palimpsest for any fashion discourse. In that context, fashion became an endless re-combination of well-known features (Sapir). However, due to the disruption of global supply chains and increasing production costs in Asia, it is now imperative we make a sustainable turn. While manufacturing in Europe declined between 1960 and 2015, the material limitations of products become ever more urgent to understand.

What may this understanding entail? First, it needs to start with a basic understanding of organic chemistry, as all textiles derive from polymers, which are built from carbon atoms combined with hydrogen, oxygen, and nitrogen. The properties of textiles derive from the chemical structure of these polymers. Second, we need to understand that these polymers need to be extracted or constructed from biomass (instead of petroleum). However, we also need to understand the production processes that may add or remove properties that are material (e.g., softness) or that have immaterial significance (e.g., colors with symbolic meaning, such as tartans). Third, we therefore need to understand the industrialization and economics of polymer and fiber production. The combination of properties and processes increases costs and defines the value or the perception of value to the consumer.

Value in products is partly material and partly immaterial. The material value comes from the costs of inputs (raw material, processing, and energy) and of labor processes. The immaterial value derives from design, branding, and marketing. They are both elastic: sensitive to cost competition (thus driven downwards) and to differentiation (thus driven upwards). Scale reduces costs, but also reduces exclusivity, and hence, value. Exclusivity (as well as scarcity), conversely, increases costs but

also increases value. Luxury derives from both variables: the use of costly materials (so-called *matériaux nobles*) and processes (e.g., made-to-measure), and thus a degree of exclusivity, but also an intensive mobilization of brand value, for instance through logos. In a strategy of global presence, scale can be achieved by a global presence combined with exclusivity, as each store has only a few items of each style. Therefore, in luxury products, price elasticity due to immaterial factors is larger than for basic products in which material properties take precedence. The topic of price elasticity in relation to material and/or immaterial properties is under-researched. Consultants have often used an educated guess of a fifteen percent price premium for each extra material feature (Scheffer, *Trading Places*). Fiber manufacturers use the same benchmark. What value an immaterial feature or the combination of adding material and immaterial features actually adds to the product for consumers has not been measured or studied.

In the case of wool, the raw material and the labor-intensive nature of processing drive up costs. For instance, the small scale of Harris Tweed® production, but also the mobilization of geographically unique features (i.e., Scotland's rolling hills), create an exclusivity that might justify a high price. While wool is far more expensive than polyamide or polyester, it also has an exclusivity in both scale and a narrative that can justify a higher price—all the more so if used in tartan designs, thus strengthening a Scottish narrative, or if tailored in a made-to-measure process. In terms of use value, wool production in Europe delivers qualities that are too coarse to justify high prices. Therefore, the price and poor intrinsic value need to be compensated with an appealing narrative. In the case of Harris Tweed®, the narrative that creates coherence between sheep grazing in the highlands and a craft-wise production in the Hebrides, leading to a product representing the looks of the British landed gentry, serves to justify a price gap with synthetic fibers, but also with high-quality industrial wool.

Use value and the value attached to material properties also possess a cultural dimension. In European culture, wool's softness and, consequently, drapability, are highly appreciated, while in Japan crispiness and stiffness are preferred. These preferences lead to higher valuation for hemp and flax in Japan compared to Europe, where high prices in wool are usually associated with softness and fineness. Cotton and polyester, having far lower costs, but also lower prices, are largely appreciated for their comfort properties and easy maintenance (Shishoo), although they also have shorter lifespans and shed micro-fibers. They have mass appeal because of the combination of materials costs and well-accepted properties, such as comfort and easy care.

The appreciation of material and immaterial values is particularly relevant in relation to the transition the world has to make toward a fossil-free economy. By 2050, all textiles will have to be biobased. Wool could be a part of that story, but also linen and hemp have to extend their niche appeal. Cellulosic, wood-based fibers will grow

in market share, while cotton production will remain stable (Harmsen). In contrast, polyesters and polyamides will have to be replaced by biopolymers. These biopolymers are likely to offer less performance than polyester. In any case, these materials may be more expensive than the current fibers. Is the urgency of sustainability going to be enough to convince consumers to pay a higher price? How much do materiality and materials (better properties) count? Or should brand appeal or design enhance the materials' immaterial value? This opens a field of research in which researchers in cultural studies, polymer chemistry, and textile technology should work together with economists and marketing researchers. The work of Anneke Smelik, for instance on Dutch fashion and sustainability, opened that avenue, but there is a long march ahead. Better put on a good woolly for the walk!

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