Animal welfare and environmental impacts in wool production

Research report

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Introduction

Every now and then newspapers are decorated with headlines to announce the latest sustainable insights regarding fibers used for clothing. The articles underneath often communicate the disastrous consequences of today’s fashion industry and consumer’s shopping behavior. In January 2017, cold winter weather was reason for Volkrant’s Loethe Olthuis to question how sustainable people’s beloved warm wool sweaters actually are (Olthuis, 2017). This again opens the discussion on how fashion companies produce their garments and on the fibers they use for the garments. The discussion is involving an increasing amount of companies that are investigating their own impact on the environmental and animal and human welfare. They are participating in a number of different initiatives to limit their use of natural resources, to make sure the people involved in all stages of production work in healthy situations and to reduce their overall impact on the planet. Although not all companies openly share their efforts in improving their performance, experience learned that most companies do in fact have their own internal programs and targets.

The natural fiber wool that is discussed in Olthuis’s article, generally makes up for a small percentage of the total used fibers of fashion companies. For this reason, companies are generally not yet involved in programs to produce and source wool in a responsible manner. Video footage from People for the Ethical Treatment of Animals (PETA) however, showed that many concerns should be raised with the current standard of wool production which often heavily burdens the animals and environments involved.

The footage that was released in 2014 by animal rights organization PETA features over thirty farms and wool sheds in the USA and Australia – two of the largest wool producing countries – and shows gruesome conditions to which the sheep were exposed (Bekhechi, 2014). The footage shows how workers beat, kick, stamp on, throw and mutilate the sheep as they shear them. Most shearers are paid by volume, which means they work as quickly as they can and neglect the sheep’s welfare. Likewise, it is considered normal in the wool industry for at least four per cent of young lambs to die every spring, primarily due to poor nutrition (Bekhechi, 2014). These images have resulted in many boycotts for wool.

The use and production of wool comes with very contradicting messages. Some people are horrified by the way in which sheep are often treated or are concerned with the amount of methane gas produced by sheep. The production of wool has a great impact on the environment and is even mentioned as one of the most polluting fibers available (Milieucentraal, 2015). Others however, advocate wool as a wonderful, natural and biodegradable fiber with great heat regulation properties and many health benefits. As a result of the negative connotations, the number of programs concerned with improving the welfare of sheep and the sustainable performance of wool production are becoming more and more. With the growing request to have a higher level of traceability throughout the entire industry (New England Wool, 2013), it is increasingly motivating to participate in wool programs to improve the production conditions and impacts. This research report will focus on both the negative and positive sides of wool production and will introduce a number of feasible initiatives that strive for responsible forms of wool production.
As a start of this research, a questionnaire was sent out to a number of Italian mills, all of which primarily produce wool fabrics. As clothing companies are often dependent on how fabric mills handle welfare and environmental issues, it was important to establish the current situation. The questions concerned the sourcing of the wool, their own production methods and whether they offer fabrics certified with a more responsible production process. The general outcome of the questionnaire shows that most mills try to improve their own impact on the environment, but only little sourcing of ethically and responsibly produced wool is done. It also shows that most mills are part of a horizontal supply chain and are therefore largely dependent on how other companies deal with their environmental performance.

Moreover, this research report examines the animal welfare issues that are linked with the production of wool in its first chapter and introduces the concept of environmental sustainability. Both are crucial to understand the problems of wool fabric production. The welfare issues are examined first as these create many opponents to the use and large-scale production of wool. Subsequently both the positive and negative sides of wool fabric production that have an effect on the environmental performance are discussed. This discussion again highlights why there are both advocates for the use of wool, but also fierce opponents at the same time. In the last chapter this report will discuss possible improvements and programs that are important to join as a company when they use wool in their garments.

The primary aim of this research report is to highlight the issues in wool production while also showing different opportunities for brands that use wool in their garments, to improve the welfare situations of the sheep and the environmental impact. All information obtained will be translated into a practical advice and source of information for brands that wish to improve their impacts in animal welfare and the environment. The advice is there to support their search into a more responsible and animal friendly way of producing wool garments.
Chapter 1
Main subjects in this research

Establishing animal welfare

Wool fibers are organic by nature and therefore seem to be a responsible product. However, there are several issues with the current large scale production of wool, which concern the welfare of sheep. Many commonly practiced procedures can be painful for the animals. Also, there is often a risk of overgrazing the pastures, which creates bad feeding conditions for the sheep. Therefore, many activists argue that ethical wool can never involve mass production (Siegle, 2014). To illustrate this, the sheared wool of one Shetland sheep, only provides for one meter of cloth.

The welfare situation of sheep and of livestock animals in general is often questioned. The welfare of an animal should include both its physical and mental state according to the American Society for the Prevention of Cruelty to Animals (ASPCA). Good animal welfare implies both fitness and a sense of well-being (ASPCA, n.d.). The issue of animal welfare has been around for decades. After the book ‘Animal Machines’ was first published in 1964, the United Kingdom government commissioned an investigation into the welfare of intensively farmed animals. This research was conducted by Roger Brambell and published as the “Brambell Report” in late 1965. One of his conclusions was that the animals should have at least the freedom “to stand up, lie down, turn around, groom themselves and stretch their limbs”, which would become known as “Brambell’s five freedoms” (Gill, n.d.). It was not until 1979 that these five freedoms were transformed into the below list of five freedoms that is still used as a reference today. The currently used five freedoms for animals are:

1. **Freedom from hunger and thirst** – by ready access to fresh water and a diet to maintain full health and vigor.
2. **Freedom from discomfort** – by providing a suitable environment including shelter and a comfortable resting area.
3. **Freedom from pain, injury or disease** – by prevention or rapid diagnosis and treatment.
4. **Freedom to express normal behavior** – by providing sufficient space, proper facilities and company of the animals own kind.
5. **Freedom from fear and distress** – by ensuring conditions that avoid mental suffering.

Even though these five freedoms have been established a few decades ago, there are still many relevant issues concerning the welfare of sheep today. PETA is one of the numerous organizations that fights for the rights of the animals and argues that the five freedoms are often disgraced instead of honored. Abominable situations were uncovered by the animal rights organization that showed the abuse and roughness of handling the sheep during shearing. They also highlighted the large amount of deaths among sheep and how they are often left untreated when injured, waiting to die. These situations are in sharp contrast to the established five freedoms that should apply to all livestock. As a reaction to the PETA campaign against wool, outdoor brand Patagonia temporarily stopped using wool in their collections and took the opportunity to improve conditions. Patagonia only started using wool again when they came up
with a wool program that ensured the animals kept for their wool production were not exposed to gruesome situations anymore (Patagonia, 2016) and that it was in line with welfare values established in the five freedoms.

While PETA and other animal rights organizations strive for absolute attainment of all five freedoms for all animals, Dr. John Webster who helped to develop the freedoms calls it unrealistic to expect the fulfillment of all five of them (Gill, n.d.). Having even Dr. Webster question the possibility of making sure that sheep are protected from all discomforts, demonstrates how complicated and delicate this situation is.

**Defining environmental sustainability**

At the same time there are many issues regarding the environmental impact of wool production. The wide use of chemicals for example has a very negative impact on our surroundings (Fletcher, 2014). Many of the used chemicals in the production of wool seep through in the ground and water, leaving both polluted. In addition, some of these chemicals can harm workers and cause serious nerve damage (Stephens, R., Spurgeon, A., e.a., 1995). Another environmental hotspot where a negative impact can be found is with the production of methane enteric emissions (Vagnoni, et al., 2013). Sheep produce methane during fermentation in the rumen and release this by farting, burping or breathing, adding up to the significant environmental impacts of livestock.

The term 'sustainability' is one that is used in a generalized manner in a great amount of different situations and areas. It is applied to numerous fields of business and can refer to completely different issues. The general consensus however when the term sustainability is used, is that sustainable development is being proposed. Sustainable development is a concept that the United Nations (UN) describe as "development that meets the needs of the present, without compromising the ability of future generations to meet their own needs" (World Commission on Environment and Development, 1987). It can be said that sustainable development is an ever-changing process. It heavily relies on local contexts, needs and interests (Unesco, n.d.), making it a very complicated concept to narrow down to one all-inclusive definition. However, John Morelli (2011, p. 5) from the Rochester Institute of Technology enriches the general definition established by the UN by saying that environmental sustainability can be defined as “a balance, resilience, and interconnectedness that allows human society to satisfy its needs while not exceeding [natures] capacity”.

Because of the variety of definitions, this research paper aspires to use one clear interpretation of the term sustainability. It will focus specifically on the environmental part of sustainability, and with that, it will narrow down the possible uses of the term sustainability. Conducting research into the environmental side of sustainable wool production starts by understanding this concept. The word environmental itself can be associated as "some kind of human impact in natural systems" (Morelli, 2011), implicating that there is always human interference in nature involved in this research. Alongside this interpretation, environmental advisor for the World Bank Group Robert Goodland (1995) presents environmental sustainability as "the maintenance of natural capital". Again this implies the interference of humans with natural processes.
These conceptions still offer a general definition but it is a good point of departure. To align the definition with the production of wool and wool fabrics, the general conceptions can be broken down into four main elements. These elements are agreed upon by several sources such as The Guardian (Hoguet, 2014), Morelli (2011) and Fletcher (2014), and will be reviewed in regards to the production and use of wool in this research report. The four components are:

- Raw material extraction
- Production processes
- Chemicals used throughout the entire production process
- The end-of-life scenario

In addition to using these four elements to determine the environmental impact of wool, Hoguet’s definition of what it means for a fabric to have a low environmental impact can add more clarity. He argues that it is ultimately about the durability of a fabric and the question of maintenance (Hoguet, 2014). Fabrics with a longer life-span that are easy to clean can be considered more sustainable by themselves.

Combining the above discussed statements and definitions, a general definition on environmental sustainability can be created that is suitable for this research report. Consequently, the definition that will be used in this report is:

“A production process that considers today’s and future environmental needs from the raw material extraction until the end-of-life phase of a fiber or product.”
Chapter 2
Animal welfare problems

A large percentage of the total wool production is sold via auction houses. It is estimated that 85% of Australian wool is offered for sale through open cry auctions (AWEX, 2017). When buying wool the current requirements of fabric mills are based on length and fineness of the fibers and price (Angelico, 2016) (Vitale Barberis Canonico, 2016). Some also try to look out for the animal welfare (Emmetex, 2016) (Angelico, 2016) but for most fabric mills, this is not yet part of the standard requirements yet. Even though the five freedoms have been established years ago, most sheep are still treated as commodities (Dan, n.d.) instead of animals that can experience pain and discomfort. To the industry it matters more how much money they can make of a sheep instead of the impact this has on the animal. To illustrate this, merino sheep - a breed with very good quality wool - have even been genetically modified to have increasing amounts of wool-bearing skin, which results in very high densities of skin folds. The extra folds in turn lead to extra heat, moisture and excrement trapped in the wool leaving the sheep feeling uncomfortable (Dan, n.d.).

The earlier discussed video footage from PETA shows that one of the major animal welfare infractions happens during the shearing of sheep (Withnall, 2014). This is frequently carried out under conditions that are in complete contrast to the five freedoms. The footage shows how sheep are “punched in the face, kicked and stamped on and had their heads slammed into the floor by unsupervised, impatient shearers, causing them great distress, injury and even death” (Bekhechi, 2014). Alongside this abuse, sheep are often deprived from water and food for 24 hours before they are shorn, in order to limit their resistance against the fast working shearers that are paid by volume, not by the hour.

Mulesing

Sheep are susceptible for parasite infections and the common manners to prevent or treat these infections are increasingly controversial. Flystrike is one of the most common insect infections sheep can catch and it occurs in seasons when blowflies are active. The flies are attracted by remnants from sheep’s excrements and nest around the breech. This results in maggot outbreaks that eat into the sheep’s flesh. Sheep farmers use several techniques and procedures to prevent flystrike infections in sheep. Mulesing is one of the procedures that are still commonly performed in Australia to Merino sheep (IWTO, 2015). It is an effective method but also a very dubious one. With mulesing, the woolbearing skin around the sheep’s breech is removed. The skin grows back hair-free after this procedure leaving the sheep less susceptible for flystrike infections. There are two different mulesing methods with ultimately the same result. With the first method the woolbearing skin is removed with a knife. Using the second method, the same area is clamped and cut off from blood supply so the skin will ultimately fall off (Responsible Wool Standard, 2016). Both procedures however are generally carried out without the use of any anesthetics or pain relief causing a lot of stress to the animals which ultimately has a negative impact on them (Philips, 2009). This is in direct conflict with two of the five freedoms that have been set for all livestock. It does not adhere to the
freedom from pain, injury or disease nor to the freedom from fear and distress. At the same time however, it can also have serious welfare implications for the sheep when the parasite infections are not controlled properly (Fletcher, 2014), so a change in approach is crucial to improve their welfare conditions.

The practice of mulesing is currently under such pressure that during the 85th IWTO congress in Sydney a group of Italian delegates presented a motion calling for immediate action regarding the welfare of the sheep and introduction of a global standard (Mathews, 2016). They are demanding that the sheep should be treated in the same way a human being would undergo any kind of surgery. The tables above confirm that although farmers are increasingly ceasing to practice mulesing or use pain relief when they still do, this positive change so far only affects a small percentage of the total Merino wool production in Australia. This means that 65% of Merino lambs still experience the pain and distress of mulesing.

There are however, several alternatives to mulesing around, that could even positively influence other procedures. For example if a farmer would shear a sheep around the breech more often, this would not only protect against flystrike but also improve the efficiency of insecticides (Philips, 2009). Other alternatives for mulesing are to improve the husbandry, to implement early warning systems of the activity of blowflies. Vaccination is even amongst the options (Philips, 2009). Furthermore, Philips mentions the importance of the quality of grass on the pastures as a focus point. If the pastures are overgrazed, the grass will stay short and in a vegetative state, with low fiber content. Providing sheep with fibrous supplements will improve their digestive system and ultimately control the diarrhea from which the remnants attract blowflies and cause flystrike. A long term and cost effective solution for mulesing can be found in breeding ‘plain bodied’ Merinos that are more resistant to flystrike (New Merino, n.d.). This breed can produce the same amount of wool and in the same quality, but have little to no skin folds making them less attractive for insects to nest.

As there are alternatives to mulesing, there is also the opportunity to source mulesing free wool. The questionnaire that was conducted amongst several Italian fabric mills, shows that a growing number of mills is in fact offering mulesing free wool (Marlane, 2016) (Emmetex, 2016) (TG di Fabio, 2016). The terms under which they offer this vary greatly however. Some offer mulesing free wool only for long term contracts with high volumes and long lead times. Others offer it with a similar or only slightly longer lead

<table>
<thead>
<tr>
<th>MULESING STATUS DECLARED BY GROWERS SELLING AT AUCTION 2016</th>
<th>% OF GROWERS</th>
</tr>
</thead>
<tbody>
<tr>
<td>NOT MULESED</td>
<td>10.9</td>
</tr>
<tr>
<td>CEASED MULESING</td>
<td>3.0</td>
</tr>
<tr>
<td>PAIN RELIEF</td>
<td>21.1</td>
</tr>
<tr>
<td>LEFT BLANK = REGARDED AS DECLARED MULESED</td>
<td>20.0</td>
</tr>
<tr>
<td>NOT DECLARED</td>
<td>45.0</td>
</tr>
</tbody>
</table>

(Australian Wool Exchange, 2016)
time compared to their ‘regular fabrics’, making this option a lot more interesting. The prices are always slightly higher, as a result of the current limited availability.

As there is a growing awareness on the maltreatment of sheep following from the PETA footage and the introduction of programs such as the Responsible Wool Standard (Renault, 2016), woolgrowers will likely need to change their approach to animal welfare. If they fail to do so, Italian wool buyer Modiano warns (Renault, 2016) they will fall behind their competitors.
Chapter 3
The environmental performance of wool

Wool as a raw material is a renewable resource that can be grown and shorn from sheep annually. It is biodegradable without any harm to the environment and can be recycled. As wool is naturally grown on sheep, it requires hardly any to no energy at all in order to grow the fiber and it also absorbs unhealthy carbons in the atmosphere providing a better environment (IWTO, 2015). Even considering the follow-up processes to create useable wool fibers, the "production typically requires almost three times less energy than polyester, and four to five times less energy than synthetic fibers such as nylon or acrylic" (Fletcher, 2014). Wool is also a fiber that can maintain its resilience and structure for many years which makes wool a long-life, durable fiber, which in itself is considered a sustainable characteristic.

Wool is also considered to be a fiber that is beneficial for people's health. Because it is a naturally grown material instead of a man-made one, the cell structure provides wool with the natural ability to breathe (IWTO, 2015). This quality offers comfort to the wearer as wool will absorb a large amount of moisture. Wool is also known for its ability to adapt to temperature making sure the wearer is not too warm or too cold. Moreover, wool by nature also does not harbor any dangerous chemicals, dust or mold that can lead to allergic reactions (IWTO, 2015). Wool is a highly durable material with inherent flame-resistant properties, and offers some natural water repellency (Hoguet, 2014). All these characteristics and properties make wool seem somewhat of a natural miracle fabric.

In contradiction to all the good qualities that wool possesses, there are organizations that claim that wool is not a sustainable fiber at all. Despite the organic nature of the fiber itself, a research conducted by CE Delft shows that wool production is actually harmful for the environment. They go so far as to claim that wool is even one of the worst performing fibers available (Milieucentraal, 2015).

Land use and methane production

One of the reasons why the production of wool fibers scores poorly on environmental performance, can be found in the large use of land needed to keep sheep. There is a maximum of only five sheep that can be raised per acre of land (Modint, 2015). When more sheep are kept per acre there is the risk of overgrazing the pastures. This can consequently result in poor nutrition for the animals, leaving them more susceptible to infections. When sheep have a more limited access to fresh pastures it conflicts with several of the five freedoms. The freedom from hunger and thirst, the freedom from discomfort as well as the freedom to express normal behavior are compromised.

The large need for land is often considered a major negative of wool production as the land cannot be used for other agricultural purposes. The pastures grazed by sheep however are often not suitable for agriculture and the land use therefore should not have such a negative connotation. Another reason to attenuate the impact of wool production, can be found in the fact that wool is often a secondary product. In
many countries sheep are predominantly kept for the production of meat. Therefore the environmental burden of sheep production must be shared between wool and meat (Cottle & Cowie, 2016).

A second reason why Milieucentraal (2015) makes the claim that wool is one of the worst performing fibers available, is because of the greenhouse gas (GHG) emissions released by sheep. In one of the largest wool producing country Australia, ruminant livestock - like sheep - are the single biggest producers of methane emissions and the largest source in agriculture (Eckard, n.d.). Methane is produced in the rumen and released by farting, burping or breathing. The feed of the animals is a crucial factor in controlling the amounts of methane produced. Proven methods to decrease the production of methane emissions in sheep are to change to new types of food and different grains, to improve the handling of manures, and better animal management (The Conversation, 2016). Emissions from livestock could be reduced significantly each year by the implementation of new technologies and better management.

**Pesticides**

Additionally, wool is often classified as an unsustainable fiber because of the extensive use of chemicals and pesticides throughout the initial stages of wool production. Sheep are very susceptible for pests such as mites, lice and flies (Organic Clothing blog, 2005) that will nest in the sheep’s skin flaps. The controlling of pest outbreaks is often still done by applying a lot of chemical pesticides to sheep. Pesticides can be any chemical or biological deterrent to natural predators (Cotton Today, 2016) and are used to help protect the sheep. Sheep are often treated with "either injectable insecticides, a pour-on preparation or dipped in a pesticide bath to control parasite infection" (Fletcher, 2014). Often enough though, these chemicals will not only remain on the sheep but seep through the soil and water systems, leaving these heavily polluted.

Until recently, organophosphates were one of the regularly used treatment baths. In a research published in the Lancet, farmers exposed to this chemical showed a greater vulnerability to psychiatric disorder and performed significantly worse in tests to assess sustained attention and speed of information processing (Stephens, R., Spurgeon, A., e.a., 1995). Only when the use of this chemical was linked to nerve damage in humans working both with the sheep and even the raw wool material afterwards, it was decided not to use it anymore. Other treatments and alternatives to the organophosphate treatment are usually highly water-soluble and can easily be carried over by rain or irrigation water and end up in streams and rivers. Because of the water soluble qualities of the used chemicals, wool cultivation has been linked to a high number of water pollution incidences in the UK (Fletcher, 2014). Consequently, wool cultivation and the chemicals used in the process, have a very negative impact on the environment.

**Scouring**

When sheep are shorn the raw wool material that remains is called ‘the cut’ or a ‘fleece’. This needs to be thoroughly cleaned before it can be processed further and spun into yarn. All the dirt, dust, grease and impurities like suint – the sweat of sheep – is removed in a process called scouring. It is a process in which the wool is put through a series of washings. Typically, the wool goes through six to eight different
baths each varying in temperature. The initial two or three baths are filled with warm water and detergent and sometimes an alkali (Woolmark, n.d.). This initial stage is where most of the water soluble chemicals and the grease are removed from the raw material. The following baths contain fresh water to thoroughly rinse the wool.

Wool is the only natural fiber that requires wet cleaning before yarn manufacture (Fletcher, 2014) and it is a process during which significant environmental impacts occur. The wool grease sludge that is a waste product of scouring, has a high pollution index and remnants from pesticides applied to sheep can often still be found in refined grease (Fletcher, 2014). These pesticides again often trickle down to rivers and other water systems when waste water is not taken care of properly, polluting the waters around scouring plants (Henry, 2011). Wool scouring is an energy intensive stage and accounts for a large part of the total energy input of wool production. Energy consumption is an important factor to measure the environmental impact of a fiber. Lastly, the huge amount of water needed in this process, results in the fiber’s bad score on environmental impact.

On the positive side, there is currently a lot of room to make major improvements in the scouring process. A better environmental performance can be achieved by eliminating the alkylphenoletleoxylates (APEOs) in scouring products for example. These APEOs have an “emulsifying and dispersing action” (Ecotextiles, 2013), which means they have good wetting, penetration, emulsification, solubilizing and washing characteristics. When certain APEOs are broken down, they become toxic with persistent and hormone disrupting properties (H&M, 2011). As discussed above, there is a high risk of water soluble chemicals contaminating the water systems around factory plants. The same risk of water pollution applies to APEOs that can be found in scouring detergents. Hence a great improvement on the environmental impact can be created when APEO substances are eliminated and replaced by cleaner alternatives.

There is a second major improvement scouring facilities can make with regards to their waste practices. After cleaning the raw wool material properly an excess of grease sludge is left. This grease sludge can be reclaimed and recycled if done properly. A good example is set by the Haworth scouring facility in Bradford which values their environmental impact greatly. They separate the lanolin from other by-products and sell it to cosmetic and vitamin industries (YouTube, n.d.). Other by-products are recycled and sold to shrimp and prawn farming facilities where they purify it into cholesterol, an essential nutrient for shrimp.
Chapter 4
Opportunities for improvement

Responsible wool standard

As more and more companies and consumers are concerned about the conditions in which their wool is produced (Control Union, 2016), there is a growing number of tools to make sure the wool is free of questionable practices. The non-government organization Textile Exchange for example, launched a new standard for wool in June 2016 called the Responsible Wool Standard (RWS). The key points established within the RWS are to

- protect animal welfare;
- preserve land health; protect soil health, biodiversity and native species;
- provide supply chain traceability;
- offer credible certification;
- allow for confident communication. (Responsible Wool Standard, 2016)

It is a voluntary standard that has been developed by the Textile Exchange in cooperation with farmers, animal welfare organization Four Paws, apparel brands and manufacturers (Responsible Wool Standard, 2016). The RWS covers issues that concern both the welfare of the sheep but also ensure that the wool comes from farms with a progressive approach to manage their land. The standard provides an opportunity for farmers to demonstrate their best practices to the public as the practices at farm level are verified. By creating a chain of custody of RWS certifications throughout the entire supply chain, brands can at the same time confidently make claims about the wool they use in their garments (Control Union, 2016).

To enact proper welfare situations, the five freedoms are used as guidelines in the standard. As a result, one of the conditions of the RWS is a non-mulesed status of the farms (Fox & Lillie Rural, 2016). However, as it is financially not possible to change an entire mulesed herd for one that is not mulesed at all, the standard also certifies farms that have confirmed to cease mulesing from the next generation of lambs onwards. Even though the standard cannot guarantee the complete protection of animal welfare, it does provide third-party audits and a transparent system to address any violations of the standard (Responsible Wool Standard, 2016) so that brands can confidently claim their wool is ethically produced.

The RWS does not only facilitate in the improvement of the established welfare issues, it is also in line with the definition established in this research to evaluate the environmental performance. The definition “A production process that considers todays and future environmental needs from the raw material extraction until the end-of-life phase of a fiber or product” works well with the ideas behind the RWS’s land management policies. The requirements to obtain a RWS certification ensure that farmers have a proper understanding of what is important now and what they need to take into account to keep their pastures healthy in the future. They should have an understanding of what impacts the health of their soil and how to maintain the biodiversity of their land. They would also need to use the minimum amounts of pesticides...
and other inputs to meet the nutritional needs of their land (Responsible Wool Standard, 2016). Due to the improvements the RWS demands, it is a great tool to help resolve many of the issues covers in this research.

**GRASS**

The Grassland Regeneration and Sustainability Standard (GRASS) is also one of the recently established tools and is considered to be the most advanced land management benchmark (Ovis21, 2016). The standard is a product of the collaboration between farmers collective Ovis XXI and The Nature Conservancy and focuses solely on land management and conservation. Rather than only making an effort not to hurt the environment, GRASS’ aim is also to actively restore damaged pastures. Even though GRASS was originally established to battle the large desertification problem in the Patagonia area in Argentina, it sets an example for other large wool producing countries that face similar issues of desertification.

The standard’s methods are based on Allan Savory’s thoughts on holistic land management (Winninghoff, 2013). He believes that the only way to restore land that has suffered from desertification is to mimic nature's ways and to restore a situation where large herds are constantly moving and grazing (Savory, 2013). With this technique Savory has achieved great results over the last decades alone. While applying his method, the main goals of the GRASS standard are to

- protect and restore Patagonia’s grasslands and their unique environments
- maintain viable populations of key native wildlife, including puma, rhea and guanaco
- provide stable markets for grassland products, including wool and meat, to the greatest degree possible given changing market conditions (Borreli, et al., 2013).

The standard does not prescribe a specific method that should be applied by the farmers. Each ranch must instead have its own improved land management specific for its own pastures (The Nature Conservancy, n.d.). Annual assessments will be carried out through and supported by the use of the Rangeland Health Index. This index helps to monitor the effects of the individual programs and to assess whether the farms can be certified with the GRASS standard or not. With the Rangeland Health Index, scores on fifteen biological indicators – such as erosion, living organisms and key species (Borreli, et al., 2013) – can be given that can range from +100 to -100. A property with a score of more than +15 is considered sustainable (Ovis21, n.d.). The indicators are calibrated with so called “reference areas” which are places that are considered to “best express biodiversity, site stability and ecosystem function within an ecological area” (Ovis21, 2016).

GRASS has developed into a standard that too adheres to this report’s concept of environmental sustainability. It aids to stop further degradation processes and measures the increase in ecosystem function and biodiversity. GRASS aims to support sustainable production and provides certification that guarantees products are conservation friendly (FAO, 2011). It ultimately results in a global certification system that retailers and consumers can understand and engage with (Borreli, et al., 2013).
Organic wool

Another option for companies or departments is to source organically produced wool. With organic wool the environmental impact is significantly lower compared to today’s traditional manner of wool production. In addition, good animal welfare is supported (Mass, sd) as organic sheep are free to express their natural behavior and have plenty of space to range freely (Garthenor, sd).

Very strict rules are to be met with the production of organic wool that are drafted by the Global Organic Textile Standard (GOTS). These rules stretch from the food for sheep and pastures they graze on and follow the complete process up to the finishing of the final fabrics. Focusing on the stages in which the sheep are involved, a great improvement in the use of chemicals and pesticides can be found in organic wool. Food for sheep for example can only be organic (or organically produced) and instead of routinely treating the sheep with pesticides and other chemicals, farmers of organic wool take a more preventative approach to disease (Garthenor, sd). Good husbandry makes the use of polluting substances less necessary and is therefore very important for organically produced wool (GOTS, 2014). Moreover, the pastures on which the sheep graze should also not be treated with any synthetic pesticides or harmful chemicals (GOTS, 2014) (Fletcher, 2014). Limiting the use of chemicals is beneficial for both the wellbeing of the sheep, the people involved in production and the environment.

With the elimination of the use of many harmful chemicals, organic wool is a good option for a company or department if they want to improve their impact on the environment and still care for the welfare of the sheep. At the same time there is also a great benefit for the final consumers wearing the woolen garments as these will not contain allergenic or toxic chemical residues from production (Garthenor, sd). This is particularly helpful for people with allergies and a very sensitive skin. Therefore, organic wool has an overall positive impact on both human, environment and animal.

Restricted chemicals

Multiple mills have confirmed to be committed to so called “detox” programs (Olimpias, 2016) (Beste, 2016). What started out as a campaign by Greenpeace to expose the link between clothing manufacturing and toxic water pollution (Greenpeace, sd) has now resulted in the rise of programs designed to banish the use of very harmful and hazardous chemicals. The goal ultimately of the detox programs is to completely “phase out the use and release of all toxic chemicals […] by 1 January 2020” (Greenpeace, sd) and to make sure that people living in close proximity of manufacturing plants are not negatively impacted by this.

The - often public - commitment from the involved companies should be based on three fundamental principles (Beste Detox, 2015). The first is “zero discharge of all hazardous chemicals” which really means that all emissions of hazardous chemicals via all waste channels should be retained. The second principle is “prevention and precaution” and expects preventative action towards the elimination of hazardous chemicals. Lastly, the third principle relies on the “right to know”. This principle implies full transparency towards the public about the hazardous chemicals and their discharge.
Limiting the use of harmful chemicals is not only stimulated by environmental activists such as Greenpeace, governments are also increasing their interference in this. An important legislation to limit the use of chemical substances is the REACH declaration. REACH is short for Registration, Evaluation and Authorization of Chemicals and is adopted by the European Union (EU) to control the chemical substances used in and imported into the EU. REACH improves the protection of human health and the environment from risks that can be posed by chemicals (European Chemicals Agency, n.d.) and aims to still maintain the competitiveness of the EU chemical industry (REACH Ready, sd). Many European farmers, factories and retailers have confirmed to comply with this legislation (Marlane, 2016) (Emmetex, 2016) making a major improvement on their impact on the environment and human health.
Conclusion

The size of today’s large scale wool production and its common practices have become part of an ongoing conversation about the negative environmental impact of textile production. Also animal and human welfare conditions play an important part in the concerns raised. With all the issues in wool production that were revealed over the last decade, it was questioned whether the natural fiber wool could still be seen as a good thing, or whether the use of wool should be brought back to a minimum.

This ongoing conversation has also resulted in a growing awareness amongst consumers of wool products and has stimulated a call for action to improve the impact of wool production. The increasing demand to improve transparency, animal welfare and the environmental impact, is slowly being answered with the emergence of programs and tools that facilitate in this. Each has its own goal or scope and will therefore not improve everything at once. However, each program helps and creates more awareness. They are all crucial for the wool industry as the consumer’s pressure on brands and farmers will be expected to grow even further and the two will fall behind their competitors and lose customers if nothing is changed for the better.

Animal welfare is protected by standards like the Responsible Wool Standard which ensures that sheep farmers adhere to the five freedoms set for all livestock animals and that practices like mulesing will no longer be carried out. It also sees to it that for example shearing is carried out under animal friendly circumstances and that the sheep can express natural behavior. The heavy burden wool production has come to bare on the grazing environments is also covered. Grazing pastures are turning into dry deserts with hardly any vegetation or ability to absorb water and the large amounts of chemicals used, leave the fields and waters around it polluted. This does not only affect the sheep, but also greatly impacts human welfare and health. Good land management and regeneration programs such as GRASS are therefore equally crucial in order to improve and limit the environmental impacts of wool production. Eliminating the use of all (hazardous) chemicals is further of high importance. The large use of chemicals has a negative impact on everything and everyone and should therefore be limited as much as possible in order to live in a healthy and viable environment.

Thus, both animal welfare and environmental impact of wool production should be taken into consideration by a brand working with wool. Consumers are increasingly informed and will be less likely to buy wool garments if they know animals have suffered greatly and the environment was badly compromised. The demand for ethically or responsibly produced wool has to come from the brands as most of the programs are currently voluntary and it is ultimately the choice of a farmer whether it is implemented or not. The brands have the power to change the supply chain with their demand. Through more brands working with ethically sourced wool, the current low availability will inevitably become larger. It becomes more accessible to all and a greater contribution to animal welfare conditions and environmental impacts will be made. The current stigma around wool should not be a reason to stop using the natural fiber altogether, but taken as an opportunity to reach out to the wool industry and help to improve production conditions and the environments involved.
The final product of this research shows a comprehensible overview of all the information in this report. It supports in the search into a more responsible and animal friendly way of producing wool garments.

The product can be accessed via: www.sylviaschmale.com
Bibliography


Beste, 2016. Meeting about sustainability [Interview] (19 October 2016).


Gill, R., sd *Texas A&M AgriLife Extension.* [Online].


Vagnoni, E. et al., 2013. Environmental performances of three Sardinian dairy sheep production systems at different levels of intensity. Trivero, Pastoralism and ecosystem conservation.


