Welsh Organic Wool and the Global Textile Standard

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INTRODUCTION

This report forms a part of the Organic Wool Wales project that, with the support of Organic Centre Wales (OCW) and the Better Organic Business Links (BOBL), has sought to find ways of developing the market potential for Welsh organic wool and improving returns to organic wool producers. This final report aims to progress the key findings from the project’s original activities – Shear Waste: the market potential of organic wool from Wales and the Organic Welsh Wool Fabric Collection – and address the central role of the organic processing requirements.

Shear Waste

Shear Waste set out to explore why, in the context of rising demand for British wool and organic textiles in general, organic wool remained largely invisible and the sustainability of the organic wool business sector so fragile. It looked at the favourable market conditions, and identified both obstacles and opportunities for organic farmers in Wales and the businesses that used organic wool.

The report argued that the supply of certified organic fleece and the volume of organic processing required scaling up in order to increase the availability of, and stimulate demand for, organic wool to manufacturers and consumers. It proposed action on the part of:

- control bodies and umbrella organisations - to address the inconsistencies between their various wool/fleece production standards and particularly address the need for convergence with organic processing requirements;
- the Wool Board – to support organic producers in their endeavours to raise the quality of raw organic fleece and permit their pursuit of alternatives sales mechanisms and buyers’ markets for organic wool;
- the Soil Association and GOTS – to consider a more accessible means of licensing small and start-up wool textiles processing enterprises;
- the organic sector – to continue its support the production of certified organic raw fleece, supply chain collaboration, higher volume processing, business capacity and the exploration of new markets and customers for organic Welsh wool.

The Organic Welsh Wool Fabric Project

Alongside Shear Waste, this practical project set out to test the available organic supply chain and the market interest, showcasing and promoting the availability and potential of organic Welsh wool to producers, designers and consumers. It:

- commissioned a length of finished woven wool fabric using organic fleece, farmed in Wales and processed within the UK to certified Global Organic Textile Standards;
- recruited textiles designers and makers with an interest in using natural and sustainable materials to participate in the development of the Organic Welsh Wool Fabric Collection using the available fabric;
- showcased the finished collection at a range of events around Wales and England throughout 2013.
The project’s experience confirmed high levels of interest in and commitment to the use of verifiably sustainable, ‘home-grown’ wool fabric on the parts of independent designer-makers and their customers. It also confirmed the key business challenges: cost and security of organic processing and continuity of supply.

**Making the connections - strengthening the supply chain**

Wool is a naturally occurring, renewable resource and the role of sheep farmers is of fundamental importance. The raw material requires processing, to a far greater extent than food however, in order for it to achieve a consumer value. The global, industrialised nature and structure of the industry and the number of distinct stages in the processing and manufacturing journey have severed the traditional connections between primary producers and end-users. There is a tenuous level of understanding on the parts of sheep farmers, in terms of the value of the raw material they produce, and end-users, in terms of the production methods involved in the wool textiles they buy.

This final report focuses on the detail of organic wool processing and the links in the industry supply chain. It aims to promote and focus the debate, between businesses, certification and inspection bodies and the Global Organic Textile Standards body itself, as to how best to facilitate the development of the organic wool sector. It sits alongside a public-facing online campaign, running from June to September 2015, to promote wider understanding of and support for organic wool amongst producers, processors, weavers, designers, retailers and the wider public.

**THE ‘NEW’ WOOL MARKET**

There is a strong sense of new fortunes about the wool industry - ecouterre quote “old fashioned an yet ….. – which the British Wool Marketing Board (the Wool Board) forecasts to continue:

- rising prices for British wool in recent years, bucking the downward trend of previous decades;
- a reduction in the supply of raw fleece across the world;
- a corresponding rise in the price of synthetic fibres;
- the international impact of Campaign for Wool;
- a renewed interest on the part of designers, manufacturers and consumers

The strengthening wool market offers parallel opportunities for organic wool. Equally as important are a range of wider textile industry trends which address key sustainability issues including animal welfare, the use of chemicals and natural resources, environmental impacts and worker abuses. They combine to give organic Welsh wool a powerful potential resonance with the new economic values of natural, sustainable, traceable and ethical:

- animal welfare standards continue to dominate consumer priorities – organic research on values;
the financial and influential reach of ‘eco-ethical’ consumers continues to expand - ethical consumption in the UK rose by 9 percent, against economic growth of 1.9%, to reach £32.3 billion in 2013;
sales of organic goods are recovering from the recession-linked down turn and, with them, organic textiles which grew by 3.4 percent and textiles licensees rose by 29% to 94 in 2014 n 2014, organic wool producers of the finer grades of fleece were paid a premium on their organic fleece;
the deaths of 1133 people with over 2500 injured in the collapse of the Rana Plaza factory in Bangladesh in 2013 prompted a global industry response in the form of the fashion revolution and ‘who made my clothes’ campaign;
following its Dirty Laundry and DeTox campaigns on the “pervasive and extensive” problem of toxic pollution from textile manufacturing, Greenpeace reported that “18 major fashion brands representing 10 percent of the retail fashion industry have begun eliminating toxic chemicals”;
the Ethical Fashion Forum, which provides supply chain information through its online platform, SOURCE, continues to report on the strong demand for natural, sustainable fashion textiles that are free from harmful chemicals;
goods that are, demonstrably, ‘made in Wales’ or ‘made in Britain’ and traceable to the grower or maker, command a premium in food and now reflected in the world of wool - the IWTO’s latest event, “Provenance and Performance”, promote greater transparency along the wool supply chain and address the growing sense of importance attached to accountability and transparency, in an era social media, twitterstorms in particular, have
Ethical Consumer magazine alerts its readers to the implications of their purchasing decisions which, in relation to clothing, are: animal testing and animal rights, climate change, pollution and toxics, habitats and resources, factory farming, supply chain management, and irresponsible marketing. product sustainability and water shortages;
new statutory regulations and industry standards on land contamination, water, waste disposal, chemicals and climate change have seen charges to the textiles industry rise and changed attitudes to use and disposal; REACH
the rising costs of water supply combined with effluent treatment/disposal, driven by water companies’ response to EC Directives to improve water quality and reduce the pollution levels, have seen textiles companies attach new importance to their water consumption, effluent discharge and waste water disposal;
Greenpeace campaigns, Dirty Laundry and Detox, have highlighted the damage caused by role played by new compliance schemes and initiatives aim to reduce the use of chemicals, such as and Greenpeace.
the textiles industry itself has developed a range of new ‘eco standards’ – ecotextileslabels.com, a UK-inspired initiative to support the textiles’ industry’s response to the sustainability challenge, lists 9 social responsibility standards, 12
textile processing standards, 7 management and 4 metrics tools, 8 transparency standards

- the Textile Exchange has established an international working group, including retailers and brands including Tesco, H&M, C&A and Gap with designers, including Stella McCartney, and established names in sustainable textiles, Coyuchi, Patagonia and Fibershed, develop is a new responsible wool mark.

- designer labels including Jigsaw, Hackett, Margaret Howell and Burberry have moved their knitwear manufacturing back to Britain in recent years, Chanel has bought Scottish knitwear factory, Barrie, America’s J Crew designs suits made from woollen fabrics made in Yorkshire and the UK wool apparel market is worth £1.24billion.

- World Textile Summit 2015 will explore business responses to the international drive for sustainable manufacturing.

Consumers and businesses are using their capacity to shape the wider market, the products available and the journey travelled from point of origin to point of sale. Spending decisions are being informed by questions about: country of origin, sustainability of raw materials, environmental impact through processing, workforce conditions, the story of its making. Alongside raw ingredients, information and traceability are key commodities in product design. It is not difficult to see how cozy a fit, organic wool and the new market trends.

WOOL PROCESSING

Wool’s multifunctionality makes it suitable for clothing, household fabrics and technical textiles. It can be blended with other natural or synthetic fibres to lend drape, insulating bulk or crease resistance. Two thirds of global supply is used in the manufacture of garments, including sweaters, dresses, coats, suits and "active sportswear". Slightly less than a third is used for blankets, carpets and upholstery. Wool's natural qualities offer textile strength, anti-static, noise absorption, insulation and heat and fire resistance.

The exact process used depends upon the type of wool being processed and its ultimate end-use. Just as the inherent physical and chemical properties of wool fibre can be exploited, so they can be altered in order to change its performance or aesthetics. Wool processors have available hundreds of additional inputs, of both natural and synthetic origin, with which to convert raw greasy fleece into a modern, highly useable commodity and transform its innate properties.

Scouring

Raw 'greasy' wool contains wool wax, suint (sheep sweat), mineral and organic dirt and vegetable matter. Most of this will be removed in the scouring process when the scoured fleece may weigh as much as 10 percent less than the greasy fleece.

There are two types of scouring in operation - the more usual water based scour, using detergents and temperature regulation, and the solvent based scour, based on … . Large,
European scouring plants will have a series of effluent processes with which to recover solid matter (fibre, dirt, vegetable matter), wool grease (lanolin, for sale to the cosmetic and pharmaceutical industries) and rinse water, and ensure any water discharged meets local residue limits.

**Additional treatments**

- **Carbonising** - removes vegetable matter (VM) from wool destined for woollen spinning. A series of acid immersions (most commonly, sulphuric acid but also aluminium chloride, HCl, thionyl chloride) impregnates the wool and VM, before drying and baking at 95-120°C turns the vegetable matter to carbon. When the wool is crushed, the carbonised matter is freed. The acid affected wool is washed and neutralised (usually using soda ash and soap) and returned to PH 5 – 6, suitable for further processing. It may also be bleached using hydrogen peroxide with formic acid prior to final drying.

- **Oxidation (chemical)** - reduces the wool’s natural tendency to shrink and felt when washed and/or agitated. The outer scales of the wool fibre are removed using chlorine gas (generated in situ from Sodium hypochlorite and sulphuric acid or chlorine gas dissolved in water) or peroxymonosulphuric acid, and the fibres then given a protective coating of a protective polyamide epichlorhydrin type polymer, hydrophobic silicone or Basolan88.

- **Oxidation (enzymes and plasma)** – offers an effluent-free alternative to the chemical process using a mixture of electrons, ions and free radicals produced from an electrical discharge), but has yet to be taken up by the industry.[ref]

- **Reductive** – modifies the internal chemistry of the wool, using applications of sodium metabisulphite or monoethanolaminsulphite, to change its natural ability to maintain its shape and resist creasing. This allows the addition of creases and folds in end textiles.

- **Additives** – to change the wool’s properties include impregnation of the fibre with heavy metals such as titanium, titanium hexafluoride, zirconium or zirconium hexafluoride to increase its inherent flame retardancy; or fibre coatings of silicon or PTFE polymers to provide a more durable water, oil and soil repellency.

**Carding, combing and spinning**

The scoured and, possibly, treated wool fibres are prepared and spun in one of two ways:

- **woollen spinning** uses fibres with a shorter staple length to produce a comparatively bulky yarn, suited to knitted garments, woven blankets and flooring;

- **worsted spinning** produces yarns with a smoother texture and finish, and are most usually used in machine and fine hand knits, and woven fabrics.

**Woollen carding**

The woollen carding process is short but the machinery may be long, over a series of teeth-bearing rollers. It is designed to tease open and then reblend the fibres into a soft, open
fibred woollen ‘mat’. This is then rubbed into slubbings – soft, yarn-like lengths of wool for spinning.

**Worsted combing**
Combing removes the remaining vegetable matter and any short fibres before subjecting the wool to a process that delivers a continuous “top” or “sliver” in which all the wool fibres lie parallel.

**Spinning**
The wool fibres, in combed slivers for worsted spinning or carded slubbings for woollen spinning, are drawn into narrower widths and twisted to give strength to the finished yarn. A ‘single’ (i.e. one twisted strand) may then be further twisted (plied) with, most commonly, one or two others to increase strength and uniformity in the resulting knitting or weaving yarn. The final yarn may be backwashed to remove any dirt from the machines and/or steamed before dispatch to the weaver or knitter.

**Dyeing**
Wool may be dyed at any one, or more, of the stages in the process stages i.e. as wool top, yarn, fabric and/or garment. That decision will depend on the requirements of the finished item and the processor’s needs in terms of price and production times. It will also determine the nature of the dyeing process and the chemicals used.

Dyeing is usually done in a water-based dyebath, into which pre-dye ‘auxiliaries’, the dye stuffs themselves and the fibre are all added. The dyebath temperature is raised slowly, typically at 1°C per minute from about 30 – 50 to 95-100°C where it remains for 30-90 minutes. The dyed wool is then rinsed or given an after treatment to remove any loose dye. The chemistry of wool dyeing means that not all the dye fixes to the fibre during the dyeing process: up to 20 percent of acid and reactive dyes are discharged, 7 percent of pre-metalised dyes and 2 percent of chrome dyes viii.

Wool, as a protein fibre, takes readily to natural dyes, with or without the need for a ‘pre-treatment’ mordant to aid dyeing. Until recently, however, dye manufacturers have focussed their efforts on developments to improve dye performance and aesthetics – ensuring colour range, consistency and durability. Dyes may be natural or synthetic in origin. They include:
- dye colours made from plant and animal sources;
- AZO Dyes, NPE (nonylphenol ethoxylates) and Pthalates – which, despite being banned in Europe, are still being found in clothing tested by Greenpeace
- Synthetic dyes, based on a wide range of synthesised and naturally occurring chemicals including heavy metals and chromes. heavy metals, chromes

**Construction and finishing**

**Knitting**
Full fashioning knit machines produce classical-styled wool knitwear in pieces for making up, either on machines or by garment workers. Single and double jersey machines enable
lengths of knitted fabric to be made for pattern cutting and then making up. The boutique, artisan and fair trade sectors employ a large number of handknitters and there are some industrial, although comparatively small knitwear factories in the UK. The lion’s share of high street knitwear is produced in large, industrial factories in Turkey, India and China.

**Weaving**
The UK retains a wool weaving sector and, in developing countries, old shuttle looms remain in use. However, their productivity is fractional to the processing capacities of overseas weavers in India, China and Hong Kong. They all produce fabrics, of varying weights and, in many cases, incorporate other fibres into the weave – both natural and synthetic – to change the fabric’s performance.

**Finishing and final wet processing**
Finishing includes a number of techniques at the end of processing and manufacturing in order to improve the handle, appearance and wear performance of the final woven fabric and/or knitted garment. It removes any residual dirt, lubricants and waxes, although the actual methods will depend on the type of wool being finished.

The finishing processes may include a combination of washing or detergent-based scouring, steam relaxation, ‘milling’ (mechanical rubbing), drying and pressing on large rolling machines to give integrity and evenness to the fabric. Fabrics may be solvent scoured. Increasingly, machinery is controlled by in-built computers, rather than operators, to control all the parameters such as speed, time, temperature and chemical additions can be set and controlled.

- Knit fabric finishing – includes washing, steaming and drying, with the possibility of milling, for woollen-spun knitting, or additional treatments such as bleaching, dyeing, printing and special applications.
- Woven fabric finishing - includes preparation of the cloth (desizing, scouring, bleaching and mercerising), dyeing, printing and additional treatments such as resin treatment, water-proofing or flame-proofing and special finishes
- Garment making and tailoring - from woven wool fabrics require finishing after they have been assembled and made up.

Water is the most important input in this process and must be extremely soft - ideally zero hardness. Traditionally, scouring and finishing plants were sited in areas of natural water softness – Yorkshire, Cornwall and West Wales. Today, it may be softened by the addition of calcium hydroxide to precipitate out the hardness-causing (calcium and magnesium) ions. Anionic or non-ionic detergents with the addition of inorganic salts such as Sodium Bicarbonate and Sodium Sulphate may also be used. At the final stage of wet finishing clothing, a chemical ‘cationic’ softener (either silicone or non-silicone) is normally applied to enhance the hand-feel.

**Additional treatments and remedial processes**
- Folds and creases may be applied using a formulated reducing agent such as cysteine (the Siroset process)
• Yarns and fabrics may be overdyed to correct colour irregularities or refinished to correct faults in knitted or woven fabrics.

**Energy and water**

Wool processing uses significant amounts of water, with some suggestions estimating that over a million litres of water are required to manufacture one metric tonne of wool. The Sustainable Apparel Coalition’s Higg Index rates the water intensity of wool only slightly better than cotton and quite a bit behind silk and polyester fabrics, which use little water in production. Recent attempts to measure the environmental impact of wool have proven futile, concluding that the systems are too variable to achieve a meaningful calculation. According to the International Wool Trade Organisation [name?] states: “There is no single LCA for “all things wool” – every wool product has its own footprint”.

Every stage in the wool process requires water and energy to run machines and, at various points, generate heat. Regular applications of lubricating oil and moisture are required through processing to protect the wool from damage, reduce static and loss, and improve machinery performance. The more stages and the longer the processing takes, the greater the need for these additional applications, the greater the risk for remedial processing and the greater expenditure of energy and water.

The quantity and composition of textile industry effluent is dependent on the type of wool, the process involved and the way the process is operated, the amount and types of chemicals used and their concentration; the amount of water used and the washwater flow rate.

**Chemicals**

As well as fleece, wool processors have developed hundreds of additional inputs to turn sheep’s wool into a wearable, usable commodity and to improve its innate properties. Many are retained in the end-product – dyes and fabric softeners, intentionally; others, intended for discharge into waste streams, still leave detectable amounts on the end textiles. Greenpeace findings point to “the presence of residues on clothing [making] end-consumers unwitting contributors to increasing levels of hazardous chemicals in the environments of countries where the products are sold, including those where such chemicals (eg NPEs) have been banned - because washing will release residual levels of NPEs in clothing into sewage systems, and ultimately contribute to increasing levels of NP in the environment.” It argues that, the amount of toxicity in any single piece of clothing may be small, but the sheer volume of clothing being sold and subsequently washed by consumers means that the total quantities being released may be substantial.

The Sustainable Apparel Coalition’s ‘Higg Index’ also recognises the importance of chemical use and uses a range of indicators, such as carcinogenicity, to assess its impact. Wool does not score well on this front – silk and hemp fabrics and leather from grass-fed cattle all do better. In fact of all the 44 materials listed in the Index, it is the fifth worst in terms of
overall chemical impact, being slightly less toxic than leather (corn-fed). This may be down to the use of chrome dyes, which require a harmful mordant to fasten colour.\textsuperscript{xii}

The ways in which and extent to which wool is processed jeopardise the sustainable, ecological and ethical merits of the end textiles - which is precisely the fate of the ‘newer naturals’ (bamboo, most notably) which, the Ethical Fashion Forum advises, “are so reliant on technological processing that their natural credentials are in name only”\textsuperscript{xxiii}.

The costs in wool processing have tended to look at the financial cost to businesses and investment in new technologies tended to focus on technological advancement in machine and chemical performance - not, for example, to reduce animal abuses, environmental impact or working conditions. The costs of water, energy and disposal, and the associated environmental regulatory regime, mean that processors are now paying serious attention to sustainability and their capacity to improve input and output efficiencies - including reducing their reliance on toxic chemicals, reducing the levels of effluence and the environmental impact, and improving efficiency in terms of resource use - fixation rates at lower temperatures, less exhaust (i.e. discharge) and narrower quality tolerances are the focus.

However, these are the very efficiencies and economies of scale that have driven the move to ever larger plants in fewer locations, in effect concentrating the environmental (and social) impacts of their effluent in the process. Greenpeace report. And economics continue to command the decision-making: chrome dyes, widely regarded as an environmentally unacceptable heavy metal with legislative restrictions on its discharge that restrict its use, as well as concerns as to the impact of the chrome on the quality of the fibre “because of their good economy and wet fastness they are still widely used for deep shades, such as black and navy.”[woolmark site]

GLOBAL ORGANIC TEXTILE STANDARD (GOTS)

Breaking new ground

GOTS can be seen as the organic sector’s departure from the conventional textiles sector’s values and modus operandi. Undaunted by IFOAM’s exclusion of fibres from regulatory control, GOTS offered a means of embedding the organic principles and practices that had underpinned the certified organic production of a fibre to be followed through into the processing chain.

GOTS’ core requirements address the priority concerns about the conventional textiles sector:

- demonstrable traceability using at least 70 percent certified organic fibres;
- environmentally friendly processing and manufacturing;
- compliance with minimum social criteria.
The Standard is managed by an international collaboration of member organisations from the USA, Germany, Japan and the UK, and engages the wider contribution of other international stakeholder organizations and experts. Established in 2006, it has come to be regarded as the leading processing standard for textiles made from organic fibres, including wool, in the world. The Standard is updated regularly: GOTS Version 4.0 was published in March 2014. The latest Annual Report notes significant growth in the standard’s certified facilities: there are now 3,663 GOTS certified facilities across the globe, a rise of 18 percent rise on the previous year. [ref]

The Top Fifteen countries in terms of the total number of GOTS-certified facilities are: India, Turkey, Germany, China, Bangladesh, Pakistan, Italy, South Korea, Portugal, Japan, France, USA, UK, Austria and Hong Kong. GOTS certified facilities are now located in 64 countries around the world. Countries with the greatest increase in 2014 were India (+338), Bangladesh (+89), Germany (+32) and Turkey (+21). A main reason for this growth is that many certified entities worldwide received more orders and more diverse orders for GOTS, so they applied for certification relating to additional production lines. Accordingly certification was needed for more sub-contracted processing and manufacturing facilities.

GOTS Annual Report 2014

GOTS aims to achieve integrity with transparency. The entirety of the supply chain, from farm through processing and manufacturing to final product, must be certified and subject to annual inspection. Every stage in the processing chain is addressed with profound implications for conventional processing and manufacturing. A Manual for Implementation is published alongside the Standard to assist in its interpretation by businesses, certification bodies and inspectors. It falls into three sections:

- Principles
- Process Criteria
- Minimum Social Criteria

**Principles, scope and structure**

The aim of the standard is clear: “…to define requirements to ensure organic status of textiles, from harvesting of the raw materials, through environmentally and socially responsible manufacturing up to labelling in order to provide a credible assurance to the end consumer. “

It covers the processing, manufacturing, packaging, labelling, trading and distribution of all textiles made from at least 95 percent or 70 percent certified organic natural fibres - there are two final labels to reflect the differences in composition. The final products may include but are not limited to: yarns, fabrics, garments, fashion textile accessories, textile toys, home textiles, mattresses and bedding as well as textile personal care products.
Criteria
The criteria require a minimum of 70 percent of certified organic or ‘organic – in conversion’ natural fibres to be used. They also permit the use of up to 30 percent of the product’s final weight to comprise of permitted non-organic fibres: the list of ‘additional fibre materials’ includes /…. Labelling is required to reflect the specifics of the textile’s fibre composition and their organic or ‘in conversion’ status.

Chemicals
Key paragraphs 2.3.1 and 2.3.2 set out the groups of chemicals, used in conventional textile processing, are explicitly banned or severely restricted from use in the primary fibre, any additional fibres or accessories:

- Aromatic and/or halogenated solvents
- Brominated and chlorinated flame retardants
- Chlorinated benzenes
- Chlorophenols (including their salts and esters)
- Complexing agents and surfactants
- Endocrine disruptors
- Formaldehyde and other short-chain aldehydes
- Genetically modified organisms (GMO)
- Heavy metals (with exceptions for iron and copper in some dyes)
- Inputs (e.g. azo dyes and pigments) releasing carcinogenic arylamine compounds (MAK III, category 1,2,3,4)
- Inputs containing functional nano-particles (= particles with a size < 100 nm)
- Organotin compounds
- Plasticizers
- Per- and Polyfluorinated compounds (PFC)
- Quaternary ammonium compounds
- Short-chain chlorinated paraffins (SCCPs, C10-13)

The basis to their prohibition is a UN hazard classification as:

- fatal/a risk of irreversible effects/danger of serious damage of health by prolonger exposure if swallowed, inhaled or in contact with skin
- suspected of causing genetic defects or cancer or
- suspected of damaging fertility or the unborn child
- may cause or causes damage to organs
- may cause irreversible …. 
- toxic/very toxic to aquatic life
- may cause long-term adverse effects in the aquatic environment
- hazardous to the ozone layer
- toxic/very toxic to flora, fauna and/or soil organisms
- may cause long-term adverse effects in the environment
- may cause long-lasting effects to aquatic life
All (other) chemical inputs intended for processing require pre-approval and registration by a GOTS Approved Certifier. An approval process is set out which includes requirements for the necessary Material Safety Data Sheet, toxicological and environmental data, test reports, independent lab analysis and traceability checks of ingredients.

General
A range of criteria address the specifics of:

- separation and identification of organic, GOTS-certified and conventional goods to prevent contamination;
- spinning – that any paraffin products must be fully refined with a limited value for residual oil of 0.5%;
- sizing and weaving / knitting – restricting sizing agents to natural starch, starch derivatives, other natural substances and CMC (carboxymethylcellulose) and limiting the use of synthetic sizing is limited; prohibiting the use of knitting / weaving oils that contain heavy metals; any other inputs must be derived from natural materials;
- non-woven manufacture – non-woven processing (for example, felting) is limited to mechanical processes such as mechanical compaction, webbing and entangling;
- treatment of wool in a closed system; permits oxygen only bleaches (peroxides, ozone etc) on wool; requires washing detergents to be phosphate-free; prohibits chlorination (for example in carbonisation) of wools.

Wet processing
In relation to dyeing, printing and finishing:

- pre-treatment and other wet processing stages – allows mechanical / thermal pre-treatment methods using natural material-based substances and GMO free enzymatic desizing, but also: restricts the use of ammonia to after-optical brightening agents (most commonly used in cotton) are allowed;
- natural dyes, synthetic dyes and auxiliaries must be in line with the 2.3.1. and 2.3.2 chemical restrictions;
- dyes classified as allergenic, those containing heavy metals (except for iron and copper in some circumstances) and natural dyes and additives from a threatened species are prohibited;
- printing methods (most commonly on cotton textiles) using aromatic solvents, phthalates or chlorinated plastics are also prohibited;
- mechanical, thermal and other physical finishing methods are allowed, so too natural and synthetic inputs that fall within 2.3.1 and 2.3.2;
- synthetic inputs for anti-microbial finishing (including biocides), coating, filling and stiffening, lustring, matting and weighting are prohibited;
- garment finishing methods that are considered harmful to workers are also prohibited.

Additional materials and accessories
Additional fibre materials may be mixed with the organic fibres, within or additional to the primary organic textile. Organic and conventional fibres of the same type must not be
blended in the same product. Clear limits are placed on the use of additional fibre materials and accessories, which may comprise:

- up to 5 percent or 30 percent of product weight (per label);
- conventional, non-GMO natural fibres - except for cotton which must be certified organic and conventional angora wool which is prohibited;
- regenerated fibres from certified organic raw materials, consumer waste or sustainable forestry management
- recycled synthetic (polymer) fibres from consumer waste:
- regenerated fibres (from non-organic raw materials):
- additional limits are placed on the use of virgin synthetic (polymer) fibres,
- stainless steel fibres and mineral fibres - asbestos, carbon and silver fibres and prohibited.

Natural, regenerated and synthetic materials are allowed, within the chemical and residue limits, with the exceptions of:

- asbestos, carbon fibres, silver (filament, treated) fibres, chrome, nickel
- material from threatened animals, plant and timber
- chlorinated plastics (e.g. PVC)
- stainless steel is permitted

Limits, in line with the proscriptions on permissible materials, chemicals and residues, are placed on the composition of:

- appliqué, borders, cords, hatbands, laces and linings, fastenings
- buckles, buttons and pressstud, edgings, elastic bands and yarns, embroidery yarns, fasteners and closing systems, inlays, interface, labels, interlinings, pockets, seam bindings, sewing threads, shoulder pads and zips

**Structural components**
Textile fillings and stuffings, if not organic fibres, must be natural and organic/in-conversion if possible. The basic principles on natural, sustainable and organic sourcing apply to supports and frames: latex foam used in mattresses must be made certified organic/in conversion or from sustainably managed forestry. Polyurethane foams are not permitted in mattresses.

**Environmental management**
Businesses must comply with the legal environmental requirements relevant to their processing/manufacturing, including air emissions, wastewater discharge and disposal of waste and sludge. They must also have in place a written environmental policy and procedures, including: data on energy and water resources with consumption per kg of textile output and target goals and procedures to reduce this; monitoring of waste and discharges and procedures to minimise waste and discharges; documentation of staff training in the conservation of water and energy, the proper and minimal use of chemicals and their correct disposal, and a programme for improvement.
Wet processing units must keep full records of the use of chemicals, energy, water consumption and waste water treatment, including the disposal of sludge. In particular they must continuously measure and monitor waste water temperature, waste water pH and sediment quantities.

**Wastewater treatment**

Wastewater from all wet processing units must be treated in an internal or external functional wastewater treatment plant before discharged to environment. The applicable national and local legal requirements for waste water treatment - including limit values with regard to pH, temperature, TOC, BOD, COD, colour removal, residues of (chemical) pollutants and discharge routes - must be fulfilled. Wastewater discharges to the environment must not exceed 20 g COD/kg of processed textile (output). For scouring greasy wool an exceptional limit of 45 g COD/kg applies.

Treatment of wastewater from water retting of bast fibres must achieve a reduction of COD (or TOC) of at least 95% for hemp fibres and 75% for all other bast fibres. Wastewater discharges to surface waters further must have a pH between 6 and 9 (unless the pH of the receiving water is outside this range) and a temperature of less than 35°C (unless the temperature of the receiving water is above this value). Wastewater analyses must be performed and documented periodically at normal operating capacity.

**Storage, packaging and transport**

Organic textile products must be stored and transported in such a manner as to prevent contamination by prohibited substances and commingling with conventional products or substitution of the contents.

Packaging material must not contain chlorinated plastics (e.g. PVC). Any paper or cardboard used in packaging material for the retail trade of GOTS Goods (incl. labelling items such as hang tags or swing tags) must be recycled from pre- or post-consumer waste or certified according to a program that verifies compliance with sustainable forestry management principles. Transport means and routes must be documented.

In cases where pesticides/biocides must be used in storerooms / transport means, they have to comply with the applicable international or national organic production standard.

**Record keeping & internal quality assurance**

All operational procedures and practices must be supported by effective documented control systems and records that enable to trace:
- the origin, nature and quantities of organic and additional (raw) materials, accessories as well as inputs which have been delivered to the unit
- the flow of goods within the unit (processing/manufacturing steps performed, recipes used and stock quantities)
- the composition of manufactured products
- the nature, quantities and consignees of GOTS Goods which have left the unit
- any other information that may be required for the purposes of proper inspection of the operation Records relevant to the inspection must be kept for at least five years.

**Technical quality parameters**

Final products need to comply with technical quality parameters including:

- Rubbing, perspiration and light fastness
- dimensional changes after washing (at 30°C for wool)
- saliva fastness for baby and children’s clothing

**Limit values for residues in GOTS Goods – primary materials and additional fibres and accessories**

Even if produced in compliance with this standard textiles may carry traces of residues (e.g. due to unavoidable contamination). The Standard lists acceptability limits of pesticides relevant for testing on wool (half of those listed). Amongst the 58 chemicals are a number in common use as external (conventional) sheep treatments: Cypermethrin (found in germicidal wound sprays), Deltamethrin, Permethrin (an insecticide); Flumethrin (used in foot baths).

**Minimum social criteria**

The Standard defines social criteria that must apply to all factory workers, home workers and sub-contractors, who are engaged in any of the textile processing, manufacturing and trading stages. They correspond to key conventions of the international Labour Organization:

- Employment must be freely chosen – with no forced or bonded labour
- Workers have the right to freedom of association and collective bargaining, including the right to join, form and operate trade unions in the workplace;
- Working conditions must be safe and hygienic with access to clean toilet facilities and appropriate rest and dining areas, and appropriate personal protective equipment provided and used;
- Child labour must not be used
- A living wage must be paid – i.e. a standard week’s pay meets national legal standards or industry benchmark standards, whichever is higher, and always enough to meet basic needs plus some discretionary income; workers must have written and understandable information about their pay, terms and conditions; deductions from wages, unless provided for by national law, is not permitted without the express permission of the worker concerned disciplinary measures must be recorded
- No excessive working hours – no more than 48 hours per week and with at least 1 day off every week on and paid at a premium rate
- no discrimination on the basis of race, caste, national origin, religion, age, disability, gender, marital status, sexual orientation, union membership or political affiliation.
- Regular employment is provided based on a recognised employment relationship, established through national law and practice, and in which obligations to employees are not evaded through the use of labour-only contracting, subcontracting, home-
working arrangements, excessive use of fixed term contracts or through ‘sham’ apprenticeship schemes.

- Harsh or inhumane treatment is prohibited Physical abuse or discipline, the threat of physical abuse, sexual or other harassment and verbal abuse or other forms of intimidation must be prohibited.

The GOTS licensee must have a policy for social accountability to ensure that the social criteria can be met and which includes: monitoring compliance with the social criteria and implementing necessary improvements at its facilities; informing workers about the content of the minimum social criteria in the applicable local language(s); maintaining records of the name, age, working hours and the wages paid for each worker; allowing workers to nominate a representative for social accountability that is able to provide feedback to the management regarding implementation status of and compliance with social criteria - recording and investigating complaints from workers or third parties related to the adherence to the social criteria and maintaining records about any necessary corrective measures arising from them - refraining from disciplinary measures, dismissals or other forms of discrimination against workers for providing information concerning observance of the social criteria.

**Quality assurance system**

**Auditing of processing, manufacturing and trading stages**

Processors, manufacturers and traders of GOTS Goods must participate in the GOTS certification procedure which is based on an on-site annual inspection cycle (including possible additional unannounced inspections based on a risk assessment of the operations).

Processors require a valid certificate of compliance listing the certified products/product categories and the processing, manufacturing and trading activities that are qualified under the scope of certification - including names of subcontractors assigned and their relevant processing and manufacturing steps. Certifiers must also be authorised

Special provisions are in place for traders:

The responsible certifier may decide to perform remote-inspections instead of on-site inspections for traders which do not have or subcontract any processing or manufacturing activities. On-site inspection must however be performed at least for the first year and every 3rd year of granted certification. Traders having an annual turnover with GOTS Goods less than 5000 € and retailers only selling to end consumers are exempt from the certification obligation; provide they do not (re-)pack or (re-)label GOTS Goods. Traders with less than 5000€ annual turnover with GOTS Goods must register with an Approved Certifier and must inform the same immediately after their annual turnover exceeds 5000€. The responsible Approved Certifier may further decide on exceptions from the annual inspection cycle for small-scale subcontractors with a low risk potential regarding
environmental and social criteria. On-site inspection must however be performed to such units at least for the first year and every 3rd year of granted certification.

The entity under whose name or brand the labelled GOTS Goods are sold to the end consumer is responsible for exercising due care in ensuring compliance of the products with this standard, the Licensing and Labelling Guide and further provisions as released by the GOTS International Working Group (IWG).

**Testing of Technical Quality Parameters and Residues**
Certified Entities are expected to undertake testing (to ISO/IEC standards) on core components as well as additional materials and accessories, in accordance with a risk assessment in order to assure compliance with the standard, particularly in relation to quality and residue requirements. ISO/IEC standards for The testing needs to meet ISO

[Trader is defined (Annex B) as: Entity trading with (=buying and selling) GOTS Goods in the supply chain between the producer of the fibre and the retail merchant of the final product regardless whether the goods are physically received or not (e.g. an import, export or wholesale trading entity). Agents that do not become proprietor of the goods and retailers only selling to the end consumer are not considered as traders.

Sub contractor (Annex B) is defined as: Entity in the supply chain of GOTS Goods performing job work (in the field of processing or manufacturing) for a Certified Entity without becoming proprietor of the GOTS Goods and not assigning an own (independent) GOTS certification.]

PROBLEMS : PROPORTIONALITY AND RISK

The problems for Welsh organic businesses …

Some of the requirements (criteria) extend beyond the processing of a GOTS-certified product to include the entirety of a processing plant’s operation – in particular on environmental management, waste water treatment, social criteria and auditing. [this is especially onerous]

The Standard It is accompanied by Both are technically detailed and complex. The majority of it applies to cotton processing. little of it relates to wool processing.

Water use and energy throughout … GOTS – opportunities to obligations on small processors could be replaced by, for example, for practical approach to kgs/process. It is ludicrous that a farm-based operation washing 100kg wool, using 20l/kg, entails no more water use or effluent discharge than having an additional bath every fortnight. =
http://www.dwrcymru.co.uk/welsh/waterefficiency/school/_pdf/waterfacts.pdf - no more than 10 extra baths per year. On average each household in Wales uses 420 litres of water a day

the relative importance of organic wool - a fractional part of the mass, global wool industry in which, currently, it makes little mark, not helped by the fact that the volume of certified fleece sold is far less than that produced.

The processing chain offers little choice and exists in extremes: small or high volume capacity. Uptake amongst British businesses of the GOTS licence is comparatively low with the cost deterring small and start-up businesses in particular.

The UK-based processing chain is fragile and under-exploited – it no longer exists in Wales

Logo/label problems – and the regs review - According to the International Wool Textile Organisation (IWTO) there are three categories for classifying eco wool and three for classifying organic wool, the purpose of which is for clarification at retail and consumer level. Eco wool: Organically grown wool Eco wool products: Organic wool product Eco wool containing products: Organic wool containing product

EU – new regs proposals
Small farmers in the Union face, individually, relatively high inspection costs and administrative burden linked to organic certification. A system of group certification should be allowed with a view to reducing the inspection and certification costs and the associated administrative burden, strengthening local networks, contributing to better market outlets and ensuring a level playing field with operators in third countries. For that reason, the concept of 'group of operators' should be introduced and defined.

Lots of them engage only in a single point in time
Or do everything but at a very small scale

IFOAM calls for improved local, national and international policies to promote sustainable organic smallholder systems and businesses.

**SOLUTIONS : RETHINKING GOTS**

The demand for organic wool is high, in theory, but undermined by pricing and lack of availability

Unless action is taken on all fronts, stimulating supply and demand, the processing chain will remain weak and goods produced prohibitively expensive.

How to do it?
Increase supply - Work with producers and the Wool Board to promote organic fleece
Increase (UK-based) production –

Work to reduce the bureaucratic burdens in the organic certification process to facilitate access and take-up by smaller and start-up processors/manufacturers
Increase consumer demand – promote the advantages …
GOTS - This is not a marginal or niche issue:
A glance at the list of wool producing countries would suggest that this is not only the case for here – there are a range of UN support to retain skills in developing economies – they too might want to use GOTS.

The GOTS supply chain

The number of GOTS-certified textile facilities rose by over 10 per cent last year. There are now almost 3,000 certified entities in 57 countries around the world producing organic apparel and textiles to this internationally recognised standard. They include: more than 220 spinning, knitting, and weaving units, 450 dyeing facilities and approximately 160 printing and manufacturing facilities. Analogous to organic certification, there are 14 ‘control bodies’ approved to certify to GOTS. SA Cert is the only UK-based control body.

There is, within the UK today, a complete organic supply chain that is capable of processing organic wool, from raw fleece into industrial felt, spun yarns and woven fabrics, and on into clothing, home textiles, mattresses, bedding and blankets, knitting yarns and wool craft kits – all to certified organic standards.

The UK organic wool sector is a small feature of the GOTS network, however. Only 61 (two per cent) of GOTS certified bodies are based in the UK. Only a third of those deal with wool. A closer look at the UK’s GOTS licensees reveals:

- a predominance of very small retail and manufacturing enterprises, often farm-based enterprises committed to exploiting the fleece they produce;
- a limited choice of processing plants catering to market extremes of very low volume (minimum quantities of 25kg raw fleece) and high volume (minimum quantities of 2 tonnes).

2015 – 42 GOTS certified bodies in the UK
21 appear to be dealing with wool
4 in Wales

In Wales, there are five GOTS certified businesses which between them producing bedding, knitwear, home textiles and yarns. There is also a weaver. It is not possible to process organic wool from raw fleece to either certified yarn or finished fabric within Wales: there are no certified scouring facilities, no certified spinning plant and no fabric finishers.

The small number of processing plants makes the organic wool sector highly vulnerable to organisational change. It is also possible for individual businesses that have a near monopoly
on their part in the chain to, in effect, determine the pricing levels for the entire sector. Organic producers may get no more for their fleece than their conventional peers but organic processing costs can be up to 20 per cent higher than conventional wool – and, at the small scale end, up to four times the cost of large scale processing.

The GOTS fee structure may be a particular deterrent to the expansion of the certified organic textiles sector beyond farms. Whereas Soil Association farms already paying an existing organic license fee are charged an additional £50 to add a GOTS license, textiles businesses pay an annual fee of £600 for theirs. This may be a significant central cost for a small textiles business which, additional to the systems and procedures required by the license, may be difficult to justify in financial terms.

The organic wool chain is undoubtedly larger than the GOTS database suggests. There are many more manufacturers and businesses, beyond licensees, with a commitment to using organic processed wool. However, all are reliant on a domestic organic wool processing chain that offers little choice and is subject to little internal market competition, and which scale paralyses business growth:

- for small and start-up organic wool businesses, the costs of processing small quantities of organic wool can be prohibitively expensive – especially woven wool fabric;
- the costs of processing small quantities of organic fleece may put the resulting yarns, fabrics and textiles beyond economic viability in the market place;
- the market for certified organic yarns, and fabrics in particular, is insufficiently developed to encourage the level of financial investment needed to launch organic production on anything other than a small ‘niche’ scale;
- within the processing chain, there is no stepping point that allows businesses to easily escape the small scale costs of processing and scale up, gradually, to the volume and more favourable pricing of the large scale industrial units.

It is possible to produce organic wool and organic wool fabric within the UK. However, it is not on a sufficiently robust scale to supply designers, fashion houses and retailers with the volume and reliability they require or, crucially, at a sufficiently competitive price.

**PROPOSALS TO GOTS**

Core principles:

No compromise to the integrity of the standard
presumption in favour of facilitating short supply chains – in food processing
– fantastic starting point – established and ahead of the game, in the event of fibres
becoming included within the revised regulation
allow risk assessment around inspection
- aim to facilitate organic businesses
- recognise the challenges for small producers
Exploiting:
the caveat for traders who sub-contract
arrangements for sub-contractors
scale and risk
certification presentation

Acknowledgements

Better Organic Business Links (BOBL)

BOBL, run by Organic Centre Wales, was a four year project designed to support the primary producer in Wales and grow the market for Welsh organic produce in a sustainable way. It aimed to:

- develop markets for organic produce whilst driving innovation and promoting sustainable behaviours at all levels within the supply chain;
- to increase consumer demand and thence markets for organic produce, especially in the home market;
- to ensure that the primary producers are aware of market demands.

BOBL has provided valuable market information to primary producers and the organic sector in general. Its focus on building capacity within the organic sector ensured that it left a legacy of processors and primary producers with improved business and environmental skills, able to respond to changing market conditions, consumer demands and climate change.

BOBL was funded under the Rural Development Plan for Wales 2007-2013, in turn funded by the Welsh Government and the European Agricultural Fund for Rural Development.

Organic Wool Project

This report is part of a wider project to explore and promote the potential of organic Welsh wool – www.organicwool.wales / www.gwlanorganig.cymru. Authored by Juliet Morris who runs an organic farm in Carmarthenshire with a particular interest in wool, it draws on the experience of a number of wool businesses in Wales, especially those working with organic wool, as well as the views of the wider industry, both within Wales and beyond, including primary producers, processors, manufacturers, retailers and certification bodies.

Special thanks is due to Sue James of Llynfi Textiles, project partner and key player in the Organic Wool Fabric project, Tony Little for his continued support and, above all, Tony Little without whose proactive enthusiasm and involvement, the project could not have succeeded.
1 British Wool Marketing Board : Annual Report 2012
2 Ethical Consumer and the Consumer Data Research Centre : Ethical Consumer Markets Report 2014
http://fashionrevolution.org/
* http://textileexchange.org/standards-integrity/standards/wool
§ http://www.iwto.org/wool/the-natural-fibre/

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† Greenpeace : Dirty Laundry Report – Hung Out to Dry (xxx)
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§ Ethical Fashion Forum SOURCE Intelligence : Should we be sheepish about wool? (2012)