



**SUSTAINABLE
WOOL LINERS**

Wool insulated packaging

How it all began



In 2002 while working with the National Trust as a consultant advising tenant farmers on packaging and branding for a wide range of produce, Angela Morris was given a specific brief to create an environmentally friendly alternative to polystyrene and polyethylene packaging for farm-fresh produce. The solution had to be suitable for direct deliveries to consumers, locally and nationwide, keeping produce chilled below 5°C for a minimum of 24 hours.

It all started in The Lake District at Yew Tree Farm, Borrowdale, with a box to deliver Herdwick lamb by courier direct to the consumer. A process of research and prototyping, materials, box sizes and liners began and a series of temperature trials of the different options were undertaken.

Wool proved not only to be a genuinely environmentally friendly option but also a far superior insulator than all of the other alternatives. Over the next few years it became evident that there was a

growing demand for Insulated Packaging and as result Woolcool was established in June 2009. Since then, the market for direct deliveries of fresh, frozen and ambient food has grown, increasing the demand for environmentally friendly reliable insulated packaging. The company is experiencing rapid growth and has been won a number of high profile awards in both the packaging and green business sectors.

Change to:- Woolcool has now become the packaging of choice for many in the mail order food sector. Due to the temperature sensitive nature of Pharmaceuticals, Woolcool is also experiencing rapid growth as a leading solution in this industry.

Every year 20 billion cubic feet of polystyrene is used globally for the shipment of 250million temperature sensitive packages across a variety of business sectors. Polystyrene is not only inconsistent in its insulative performance but is environmentally unsustainable.

It is certain that packaging applications will provide a genuine new high usage market for wool, which will ultimately make a huge difference to the wool industry here in the UK and worldwide.

WOOL - THE ORIGINAL SMART FIBRE

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Woolcool lifecycle summary



SUSTAINABLE NATURAL RESOURCE

The key component of Woolcool insulated packaging is pure wool; one of our most abundant and sustainable natural resources, but also a by-product of sheep reared for meat.

The rise of man-made fibres has caused dwindling demand for wool and a low market value for fleeces, causing many sheep farmers to regard this by-product as waste rather than a valuable source of revenue.

The coarse wool varieties have the lowest market value and are most widely regarded as waste, but these are also the best for use as Woolcool insulation. Approximately 75% of British wool fibre is more than 27 microns which is generally too coarse to use in clothing, fabrics etc. Wool is collected and sold by the British Wool Marketing Board to merchants who supply The Wool Packaging Company. It is then washed and scoured without any additives or use of extreme temperatures

The fleeces are washed and scoured without the use of harmful detergents, in accordance with PPC regulations and ISO14001 environmental management systems, to remove any traces of dirt, vegetable matter or Lanolin. The resulting nitrate and mineral rich 'sludge' is preserved for use

as natural fertilizer or made into biodegradable slug pellets. Valuable natural Lanolin is also separated out and used in the cosmetics and pharmaceuticals sectors. The almost clear effluent water is naturally treated to Environment Agency standards then discharged into the local sewerage system for the usual water treatment.

To produce Woolcool insulation the pure washed wool is garnetted, carded and needle felted by UK nonwoven textile manufacturers, without the addition of any manmade fibres. The felted wool is then cut into slabs.

The slabs of Woolcool insulation are tightly packed into cages and delivered to our UK packing operation. To maximise the longevity of the Woolcool insulation and allow the fibres to perform their hygroscopic function, the cut slabs are sealed within a recyclable MDPE (medium density polyethylene) microperforated bag, which provides a hygienic moisture permeable barrier between the wool and the product. The finished insulation liners are then distributed to customers

Woolcool has researched plant based and degradable options for the protective bag, and has been advised by WRAP that recyclable MDPE is the most environmentally responsible option at the present

time. The natural, degradable and oxodegradable alternatives are currently problematic for recycling systems.

Woolcool keeps up to date with developments and continues to consider practical liner bag options as part of their ongoing product development strategy. The recyclable MDPE currently used in Woolcool is manufactured in the UK and can be readily recycled at local authority household waste centres. The Woolcool insulation liners are suitable for re-use by customers. The wool is compostable and biodegradable, releasing valuable nutrients back into the soil.

Alternatively end users find many uses for the wool, such as protecting roses from the frost to lagging pipes. Woolcool insulated packaging is a superior and genuinely environmentally friendly solution.

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Wool, the natural way forward

Pure wool for packaging solutions



Abundant, sustainable, biodegradable and with unique natural properties, wool is Nature's Smart Fibre. For protective and temperature sensitive packaging, wool provides the natural alternative to polystyrene, polyethylene and other man-made materials.

Wool fibres have an incredibly effective hygroscopic ability to absorb moisture without becoming damp, which reduces humidity and maintains stable temperatures, either cool or warm. They have an overlapping cell structure which traps air and prevents its movement giving insulative values comparable to that of still air. The cell structure of wool fibres makes them extremely flexible and creates a material with a memory effect which returns to its original shape after compression.

Wool is sourced and processed specifically for making Woolcool to ensure it doesn't contain additives, such as borate or polyester, found in other types of wool insulation. Fleeces are washed and scoured in accordance with PPC regulations

and ISO14001 environmental management systems, without the need for extreme temperatures, chemical treatments or additives.

Woolcool was established to provide well-designed, cost-effective packaging products with unrivalled environmental credentials, using pure sheep's wool. As there is no one size fits all solution, Woolcool work closely with our customers to create bespoke insulated packaging solutions to dovetail with existing distribution systems and to help companies introduce more environmentally responsible practices.

Woolcool is a versatile insulated packaging system comprising naturally finished sheep's wool sealed within recyclable, food-grade wrap to create liners for recycled and recyclable delivery boxes, pouches and postal packs.

From fresh foods to pharmaceuticals, Woolcool has been proven to keep contents below 5°C for well over 24 hours and between 2°C and 8°C for 72 hours and beyond, out performing the alternatives.

Woolcool is perfect for Ambient requirements too.

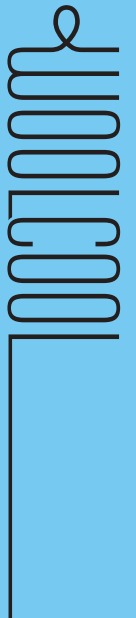
Rigorous testing to industry standards in our own environmental chambers supported by independent trials consistently proves that Woolcool insulated packaging maintains food contents at their required temperature for longer than conventional materials.

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Wool insulation



The wool used in the creation of Woolcool insulation is pure sheep's wool and is primarily made from coarser grey fleeces. Wool fibres are not harmful in any way. Due to the thickness of wool fibres, they are not absorbed into the body through the lungs, unlike mineral wool and glass fibre. Hence no protective clothing or equipment is required to handle wool insulation.

Wool fibres have many overlapping scales which make them extremely flexible and create a memory-effect. After significant compression, wool will return to its original shape. They are hygroscopic by nature and can hold up to 35% of their own weight in moisture with no adverse effect on natural insulative properties and without feeling damp to the touch.

By naturally releasing and absorbing this moisture wool creates a warming or cooling effect. Wool fibres have been proved to absorb smells, bacteria and toxic particles. Grazing sheep also absorb and lock away carbon from the atmosphere.

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Wool scouring process



WOOL - THE NATURAL WAY FORWARD

Woolcool purchase wool from the scouring facility that operate an environmental management system according to ISO14001, Certificate No. EN1001.

Accreditation was achieved in July 2001. The company is also accredited for ISO 9001:2000 Quality Standard, Certificate No. 3025.

Wool scouring is a prescribed process and as such falls under the PPC regulations 2000. EA permit No. BR4705. All raw materials to conduct the process and its effluent treatment system are purchased from reputable suppliers and are stored and used according to good safety and environmental practice and in accordance with manufacturer's data. Raw material use is minimised by use of control systems and records of use are maintained. Wool is received in bales in its raw state – containing natural wool waxes, dirt and vegetable matter. In order to clean the wool fibre of these contaminants the wool is taken from the bales and physically separated so that the fibres are in an open configuration.

The fibre is then passed through a series of warm wash and rinse bowls where the

contaminants are removed into the aqueous bowl liquor. The cleaned wool fibre is then dried in a warm air dryer and then transported pneumatically to large bins where different wool grades may be blended together by physical mixing before the final cleaned and blended fibre is packed into bales to await transport from the site.

The liquor is treated in an on-site effluent plant to reduce pollution load before discharge to sewer within its water company and environment agency consent limits. The treatment results in a wool grease by-product that is a valuable source of chemicals to the speciality chemical industry and a sludge that contains the bulk of the contaminants that is composted off site and returned to the land as a soil improver. Air from above the wash bowls is treated using a water spray scrubber to remove residual odour before discharge to the atmosphere.

No discharges are made to ground waters and all liquid discharges from the process are to public sewer from whence they will be further treated in a sewage treatment works.

The waste products from the process are dirty bowl liquors and physically removed dirt and vegetable matter mixed with a little broken fibre. There are other packaging and general wastes that are segregated and disposed of according to good practise. All solid wastes are disposed of according to duty of care using licensed carriers.

The plant is monitored for discharges to sewer by the sewage undertaker and by the Environment Agency on a regular basis and the company carries out its own regular checks to assess the performance of the abatement plant.

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Woolcool standard courier box

Material specification

MATERIAL SPECIFICATION

Woolcool's Standard box range consists of a Corrugated Cardboard box and 2 liner sets. Liners can also be sold separate from the box. The Woolcool Standard 'Courier' Boxes are manufactured using a minimum of 75% recycled materials, which are also 100% recyclable and biodegradable.

Any virgin fibre used is derived from managed forest plantations that are 100% sustainable.

The inks used in the litho process are oil based, but are recyclable and are not detrimental within the paper recycling system.

Corrugated packaging is made from papers originating from either virgin or recycled fibres; corrugated board is a highly environmentally efficient material with an unbeatable record for recycling and recovery. There are, in corrugated material terms, two forms of environmental solutions; namely sustainable and recyclable.



Sustainable

Sustainable materials are virgin fibre based and are controlled by a variety of forest management schemes under Chain of Custody accreditation. The most widely known organisations within chain of custody are FSC and PEFC.

FSC – (The Forest Stewardship Council) is an international organisation promoting responsible forest management. It operates a scheme that traces and verifies timber and wood products originating from FSC certified forests. It also works closely with the Governments within the certified regions and has the support of other environmental organisations. As public concern about the state of the world's forests and timber resources increases, being FSC certified shows compliance with the highest social and environmental standards on the market. **For information on FSC contact - www.FSC.org**

PEFC – (The Programme for the Endorsement of Forest Certification Schemes) is an independent, non-profit, non-governmental organisation founded in 1999. It promotes sustainable managed forests through independent third party certification. The PEFC accreditation provides assurance of legal sourcing and sustainable forest management. **For information on PEFC contact - www.pefc.org**

Recycled

This involves the use of materials that have originated from re-pulped paper and packaging based products. Approximately 80% of the corrugated packaging used in the UK is recycled. The recycling loop is very efficient. The fibres used in corrugated packaging can be collected, recycled, re-used and back on the shelf in store within 14 days of disposal. The re-use of the fibres in corrugated packaging through the process of recycling minimises waste disposal to landfill and reduces the need for virgin wood pulp. For further information on the excellent recycling credentials of corrugated packaging, **visit www.recycledpaper.org.uk**

Carbon Trust

Our suppliers strive to meet the Carbon Trust standard. It is the world's first carbon award that requires an organisation to measure, manage and reduce its carbon footprint and actually make real reductions year-on-year. Achieving the Carbon Trust Standard enables Companies to take advantage of the business benefits that come from reducing carbon emissions, as well as demonstrating to customers their real commitment to fighting climate change.

Visit www.carbontrust.co.uk for more information.

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Woolcool pouches and postal packs



Woolcool Pouches and Postal Packs are a range of recyclable insulated envelopes and pouches designed for sending one or two speciality food items in the post or chilled or frozen products within an ambient food box or hamper.

Woolcool postal packs are available in A3 or A4 size and long enough to fit a whole salmon. Both products are made from white recyclable LDPE with an extra secure 15mm self-adhesive strip. Woolcool pouches are also available with clip-together handles as ready-to-go cool bags.

The soft and flexible fleece lining also provides excellent protection by snugly cushioning contents of all shapes, sizes and materials.

Woolcool Pouches and Postal Packs are perfect for delivering smoked salmon, cheeses, cured meats, chilled potted products and individual meat or fish items, offering mail-order companies greater flexibility to tailor-make deliveries to customer's personal requirements.

In the Pharmaceutical sector our pouches are used for the distribution of smaller medication, for example, direct to the patient or for transport around hospitals.

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Woolcool liner bag

Material specification



Marlex HHM TR-131 Medium Density Hexene Film Resin

- caliper (mu) 35 +/-5%
- density g/cm 0.938
- whiteness less than 5%
- food contact – this resin meets FDA regulations 177.1520 and 90/128/EEC and all its amendments for food packaging.
- the material is fully recyclable
- storage guidelines – this product should be stored, handled and used in accordance with good industrial hygiene practices. Store in a cool dry well ventilated area.
- general – this medium density polyethylene resin blends well with HMW film resins and the film produced provides a good balance of impact and tear properties.

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Woolcool benefits

Credentials

WOOLCOOL

WOOL - THE ORIGINAL SMART FIBRE

GREEN	Woolcool	Polystyrene	Polyethylene
Biodegradable	Cardboard and wool	Non-biodegradable	Non-biodegradable
Recycled/recyclable	Cardboard, wool, film wrap	Limited and expensive	Limited and expensive
Compostable	Cardboard, wool	Non-compostable	Non-compostable
Naturally sustainable	Abundant sheeps wool	Oil based – finite resource	Oil based – finite resource
Toxicity	No harmful gases in production or storage	Toxic gases in production and storage	Toxic gases in production
Storage/delivery	British made and supplied flat packed for low delivery mileage	Many origins and bulky to deliver which increases delivery mileage	Many origins, adding to delivery mileage
Additional benefits	British made and creating new revenue for sheep farmers	Many origins	Many origins
QUALITY			
Temperature control	2x500g ice sheets recommended for a 25L capacity box	6x500g ice sheets recommended for a 25L capacity box	6x500g ice sheets recommended for a 25L capacity box
Temperature stability	Minimal void spaces maintain constant temperature	Preformed insulation creates voids and less constant temperature	Rigid insulation creates voids and less constant temperature
Protection	Fleecy liner creates protective cushioning around the contents	Preformed packaging means movement and damage without additional packing	Rigid packaging means movement and damage without additional packing
Durability	Sturdy boxes and fleecy liner unlikely to break	Brittle nature means more broken and unusable boxes	Relatively sturdy as liner within cardboard box
Deterioration	Recyclability means no need for prolonged life span and associated risks	Tendency to 're-use' despite possible bacteria build up as cartons crack and crumble	Tendency to 're-use' despite possible bacteria build up on insulation liner
Health risks	Breathable packaging inhibits growth of bacteria, even if seepage occurs	Airtight containers can create conditions for bacteria growth, especially if seepage occurs.	More breathable than polystyrene means less likelihood of bacteria build-up
Fire risk	Sheeps wool is naturally fire retardant but regular fire precautions should be observed	Highly flammable, toxic gases and special regulations for storage	Flammable and toxic gases when burning
COST			
Storage/delivery	Supplied flat-packed for better value bulk ordering	Bulky to deliver and store meaning more, smaller orders at higher costs	Quite bulky to deliver and store meaning more, smaller orders at higher costs
Waste disposal	Biodegradability & recyclability means no special disposal costs	Special requirements for environmentally responsible waste collection and disposal	Special requirements for environmentally responsible waste collection and disposal
Ice packs	60% fewer ice packs	More ice packs	More ice packs
Added value	Positive 'eco-friendly' marketing message to drive sales	Negative packaging image	Negative packaging image

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Woolcool insulation liners

Another lease of life



Try using them for one of the jobs suggested by other Woolcool customers:

- stop outdoor taps freezing
- protect fruit trees from frost
- draught excluders
- loft insulation
- pipe lagging
- garden kneeling pad
- feeding roses
- ski pads
- homework projects
- compost
- hanging baskets
- pet baskets
- cushion stuffing
- keep picnics cool
- keep takeaways warm
- donation to animal shelters
- home brewing fermentation buckets

THERE'S MORE TO WOOLCOOL

We'd love to hear about your imaginative ideas for alternative uses of Woolcool. Please email us at: sales@woolcool.com or contribute on Twitter with #LetsBoxClever

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