# UCL develops odourless cellulose fibres from cow dung for sustainable fashion



# Turning Cow Dung into Sustainable Fashion: A Revolutionary Approach

As concerns about the environmental cost of fast fashion intensify, a new and innovative solution has emerged from the laboratories of University College London (UCL). Researchers have pioneered a method to transform cow dung into cellulose fibres, a process that could drastically reduce textile waste while utilising a renewable resource.

This groundbreaking study, published in *The Journal of Cleaner Production*, reveals the potential for repurposing agricultural waste into sustainable fabrics that do not carry the odour or visual markers of their origins. Cow manure, a significant by-product of dairy farming, contains cellulose debris from the plants consumed by cattle. This cellulose can be extracted through a simple chemical process, enabling the creation of fibres that are both environmentally friendly and cost-effective.

Professor Mohan Edirisinghe, the senior author of the study, highlighted the straightforward nature of the extraction process, stating, “Extracting the fragments from dung was relatively straightforward using mild chemical reactions and homogenisation." The resulting liquid is subsequently spun into cellulose fibres using a pressurised spinning technique, where jets of liquid are propelled from a rotating drum—a method that the researchers refined through experimentation.

The implications of this technology are substantial, particularly in light of projections that suggest global agricultural production will see an increase of 40% in animal waste by 2030. Around five billion tonnes of manure could be generated annually, much of which is currently a liability for farmers. Professor Edirisinghe explained that improving waste management in agriculture is imperative, as the decomposition of manure can pollute waterways and contribute to greenhouse gas emissions. By transforming waste into valuable textile products, the potential exists for a win-win scenario that benefits both farmers and the fashion industry.

This advancement aligns with a broader movement in sustainable materials science, as additional studies have recognised livestock dung as a promising source of high-value materials. For instance, research from the University of Bristol has explored extracting nanocellulose from animal waste, a biodegradable material with numerous industrial applications. This not only promotes a circular economy but also significantly reduces the reliance on conventional, environmentally detrimental materials.

Moreover, sustainable textiles derived from natural sources are becoming increasingly vital as the fashion industry grapples with severe environmental challenges. Innovative methods such as using recycled cellulose from cotton waste or bacterial cellulose are emerging as alternatives, paving the way for a textile landscape less dependent on petroleum-based and synthetic materials. Insights into these various approaches highlight a broader effort within the scientific community to address the pressing need for sustainable practices in the production of clothing.

With the new cow dung-based cellulose fibres, the researchers suggest the possibility of scaling up production to meet the demands of a rapidly growing textile market. Yanqi Dai, the study's lead author, pointed out that this technology could incentivise farmers to adopt better waste management practices, transforming a pollutant into a precious raw material.

In practical terms, the fabrics produced from this cellulose could vary widely, allowing for a range of applications beyond clothing, such as home textiles and biodegradable packaging. As societal and ecological pressures mount, the fashion industry stands on the brink of significant transformation, with cow dung-filled fibres potentially leading the charge.

For consumers wary of the impacts of fast fashion, this development offers a glimpse of a sustainable future, where clothing is not only affordable but produced with the planet's health in mind—a vital step towards mitigating the environmental costs associated with textile manufacturing.

As we peer into this burgeoning field, it is clear that the intersection of waste management and innovative textiles might just redefine the fabric of our lives.

## Reference Map:

* Paragraph 1 – [[1]](https://www.dailymail.co.uk/sciencetech/article-14687591/clothes-cow-manure-engineer-produced.html?ns_mchannel=rss&ns_campaign=1490&ito=1490), [[3]](https://www.bristol.ac.uk/cabot/news/2023/cow-dung.html)
* Paragraph 2 – [[1]](https://www.dailymail.co.uk/sciencetech/article-14687591/clothes-cow-manure-engineer-produced.html?ns_mchannel=rss&ns_campaign=1490&ito=1490), [[2]](https://www.mdpi.com/1996-1944/16/2/648)
* Paragraph 3 – [[1]](https://www.dailymail.co.uk/sciencetech/article-14687591/clothes-cow-manure-engineer-produced.html?ns_mchannel=rss&ns_campaign=1490&ito=1490), [[3]](https://www.bristol.ac.uk/cabot/news/2023/cow-dung.html)
* Paragraph 4 – [[1]](https://www.dailymail.co.uk/sciencetech/article-14687591/clothes-cow-manure-engineer-produced.html?ns_mchannel=rss&ns_campaign=1490&ito=1490), [[5]](https://www.technologynetworks.com/applied-sciences/news/scientists-manufacture-100-recycled-viscose-for-the-first-time-384645)
* Paragraph 5 – [[1]](https://www.dailymail.co.uk/sciencetech/article-14687591/clothes-cow-manure-engineer-produced.html?ns_mchannel=rss&ns_campaign=1490&ito=1490), [[6]](https://www.asm.org/Articles/2023/December/Are-Bacteria-the-Next-Big-Thing-in-Fashion)
* Paragraph 6 – [[1]](https://www.dailymail.co.uk/sciencetech/article-14687591/clothes-cow-manure-engineer-produced.html?ns_mchannel=rss&ns_campaign=1490&ito=1490), [[4]](https://www.sciencedaily.com/releases/2024/10/241030150323.htm)

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## Bibliography

1. <https://www.dailymail.co.uk/sciencetech/article-14687591/clothes-cow-manure-engineer-produced.html?ns_mchannel=rss&ns_campaign=1490&ito=1490> - Please view link - unable to able to access data
2. <https://www.mdpi.com/1996-1944/16/2/648> - This study explores the extraction of cellulose fibers from cow dung using various treatments, including hot water, hydrogen peroxide, sodium hydroxide, and potassium hydroxide boilings. The researchers found that potassium hydroxide boiling yielded the highest extraction rate, producing cellulose fibers suitable for papermaking. This research highlights the potential of cow dung as a sustainable source of natural cellulose fibers, offering an eco-friendly alternative to traditional materials and opening new applications in the paper industry.
3. <https://www.bristol.ac.uk/cabot/news/2023/cow-dung.html> - A collaborative study by scientists at the University of Bristol, Scotland’s Rural College (SRUC), and the University of Edinburgh has investigated the potential of livestock dung, particularly from ruminant animals like cattle, as a source for high-value materials. The research suggests that dung could be utilized for extracting nanocellulose, a biodegradable material with promising applications in various industries. This approach could lead to sustainable alternatives to conventional materials, promoting a circular economy and reducing environmental impact.
4. <https://www.sciencedaily.com/releases/2024/10/241030150323.htm> - Researchers at Kaunas University of Technology have developed a method for producing a nanofibrous cellulose matrix from recycled cellulose, which has potential applications in textiles and medical devices. This environmentally friendly process utilizes 'green solvents' and can use either raw cellulose or cellulose waste as raw material. The resulting fibers are strong, biocompatible, and absorbent, making them suitable for various applications, including tissue engineering and regenerative medicine, offering a sustainable alternative to petroleum-based materials.
5. <https://www.technologynetworks.com/applied-sciences/news/scientists-manufacture-100-recycled-viscose-for-the-first-time-384645> - Researchers have developed a process to produce viscose fibers entirely from recycled materials, specifically worn-out cotton sheets. The method involves dissolving the cotton in a zinc chloride solution, precipitating a dissolving pulp, and then processing it into viscose fibers. This innovative approach reduces the need for wood pulp and minimizes the use of toxic chemicals, offering a more sustainable and environmentally friendly alternative to traditional viscose production methods.
6. <https://www.asm.org/Articles/2023/December/Are-Bacteria-the-Next-Big-Thing-in-Fashion> - This article discusses the emerging trend of using bacterial cellulose (BC) in the fashion industry. BC is a biodegradable material produced by bacteria, offering a sustainable alternative to traditional textiles. The article highlights recent developments, including collaborations between fashion brands and biotech companies to create BC-based clothing items. Despite its potential, the widespread adoption of BC in fashion faces challenges such as hydrophilicity and the need for further optimization to improve its properties for practical use.
7. <https://www.fiberjournal.com/movers-shakers-february-2023/> - Professors at Columbia University have developed BioEarth, a textile composed of over 60% soil, suitable for making clothes. Co-designed by Penmai Chongtoua and Professor Lola Ben-Alon, BioEarth is thin, strong, and has a leathery feel with slight sandiness. The material's flexibility was enhanced by blending with bioplastics from corn starch, cellulose, and algae. BioEarth is strong enough for laser cutting, embroidery, and machine sewing, aiming to replace mainstream textiles like cotton with a more sustainable option.