Cold feet? Warm socks.
Keep your feet warm!

Everyone knows how it feels to have cold feet. You try to jump up and down in one spot, frantically wiggle your toes or kick one foot against the other. Nothing helps.

We at Woolpower AB in Östersund, Sweden, have a long and extensive experience with cold weather, cold winters and, most importantly, with how best to dress to stay warm when it’s cold.

We want to share our knowledge and our experiences about how the body and feet work when it is cold, and the best ways to stay comfortably warm and dry on your feet. After all, your feet are your shock absorbers throughout your life!

Warm Regards from us at Woolpower AB.
The body in cold weather.

The ideal temperature balance for the body is when it keeps a constant temperature of 37 °C (98.6 °F). At the same time, a normal foot temperature is between 30 and 35 °C (86 and 95 °F). The body normally regulate this with the energy it generates and, in cold weather, through the use of insulative clothing.

In order for our bodies to work properly, we need to provide energy in the form of food and water. This enables our hearts to pump, our muscles to work, and our brains to function. Approximately 70% of that energy is needed to maintain the constant core temperature.

Body heat is created by burning food, such as fat, carbohydrates and protein. Heat is produced mainly in the muscles, and increases the more muscles are worked. In a cold environment, the body needs external help to maintain its temperature. We have to add extra energy by drinking and eating more, we need to dress right, and we need to keep active in order to avoid getting cold.

At rest, our bodies’ normal heat production is roughly 80 to 100 Watts. During intense physical work, the body can put out 1000 Watts.

When the body gets cold it tries to create heat by shivering, which is involuntary muscle movement in order to create warmth. The body can increase its own heat production 4 to 5 times by shivering. The body also decreases blood flow to the hands and feet and in general reduces blood flow to minimize loss of heat in the body’s core. This gives priority to the heart, brain and other vital organs.

To perspire is a normal reaction when the body is too hot and needs to cool down the skin. The skin cools because the moisture – sweat – evaporates. This functions very well in a hot climate, but in cold weather, when you are wearing lots of clothes, heavy sweating can prove disastrous.

0.5 to 1 liter of fluid evaporates from the skin every day. During hard work, the evaporation can reach several liters per hour. In general, men perspire more than women.
Clothes don’t actually provide heat. But they do allow you to retain and maintain the warmth that you need. Clothes should insulate and support the body’s temperature balance. And at the same time that our clothes should help retain heat that the body produces, they should also transport excess moisture and heat away from the skin.

Adventurer Fredrik Sträng just below the summit of Mt. Everest. He has never been anywhere so cold.
12 tips for warm feet.

Keep the whole body warm.
In order to keep your feet warm, you have to focus on your whole body. When the body gets cold it puts a priority on keeping the heart, brain and other vital organs warm, and so reduces heat flow to the hands and feet. This is why your feet and hands usually feel cold first, even if the rest of the body feels warm.

1 Keep the body warm. And put a hat on.
In order to keep the feet from getting cold, it is important that the rest of the body is properly dressed. A head without a hat works like a chimney where a big part of the body heat escapes.

2 Eat and drink.
The body needs energy in order to maintain its temperature balance, so do not forget to eat and drink. And it is not necessarily warm liquids that you need in order to keep warm, but rather energy rich food and drinks.

Retain the body’s heat.
Shoes should prevent the cold from reaching your feet and retain the heat that the body gives off. Shoes should protect against cold, wet and wind. If possible they should also transport moisture away from your feet. They should be built to offer support, have good fit and not give blisters.

An efficient way to dress in cold weather is with the layering principle. Using multiple layers helps transport moisture away from the skin, and the layers trap air which maintains body heat. It also offers flexible protection against cold, wind and moisture. Layering is not only for your body, but also your feet, hands and head.

3 Double up on the socks.
The layering principle is for socks as well. Wear a thinner, fitted sock closest to your foot and a thicker sock on top of it. This system helps absorb moisture from the foot and also traps maximum amounts of air. This also helps you avoiding blisters as friction is dissipated between your socks and not against your skin.

4 Do not conduct the heat.
A cold surface can conduct a large amount of heat away from your feet, so it is important to insulate your feet as much as possible. Use an insulating insole, preferably one made from wool, inside your
shoes, and stand on a foam pad or some pine branches to prevent your feet’s warmth from being conducted to the cold ground.

**Keep your feet dry.**
Wet feet quickly turn into cold feet. During low activity, one of your feet perspires roughly 3 ml of moisture per hour while heavy activity puts it up to about 15 ml. During very heavy work, the perspiration can exceed 30 ml per hour.

In order to keep your feet warm in cold weather, it is very important to transport moisture away from them. That moisture simply has to go away: water conducts heat 25 times more efficiently than air, so the heat loss from moist feet is significant.

**5 Use the right socks**
Keeping your feet dry is vital when you don’t want to have cold feet. Use socks made from moisture transporting material, such as wool. Wool fibers absorb moisture remarkably well, and can absorb up to 30% of their own weight in moisture without feeling moist. And wool gives off some heat when wet, as well.

**6 Change into clean and dry socks often.**
Switch socks just before going outside in the cold so that they are not too warm and moist from being worn inside. By alternating between two pairs of socks, you can change multiple times during a day.

**7 Dry your moist socks.**
To dry out your moist socks, use your body heat. Tuck your damp socks inside the waistband of your pants and let them dry from the heat that your body gives out.

**Vent more.**
Many problems with cold feet are caused by a lack of ventilation. Very dense materials in socks, shoes and boots only allow for a small amount of moisture to evaporate. These will work as a moisture barrier.

**8 Move the moisture with wool.**
When your feet perspire heavily, wool will actively absorb the excess moisture and move it away from your skin. Too much cotton in your socks will retain the moisture, and keep it from evaporating away.
9  **Take your shoes off.**
   Take your shoes off when you take a break so that the moisture in them gets the chance to escape.

**Think of your circulation.**
If the blood flow to your feet is impaired for any reason, your feet will quickly become cold. Pay attention and make sure that you do not lose the feeling in your feet, as this can be the beginning of frostbite.

10 **Plenty of room.**
   Use shoes that allow for some extra room, and do not overtighten them. This can reduce blood flow and your feet will quickly get cold. You have to be able to move your toes.

11 **Move both your toes and feet.**
   By moving both your toes and feet, you stimulate blood flow. This increases your feet's temperature and reduces the risk of localized frostbite.

12 **Take care of your feet.**
   It is important to take care of your feet. Clean and dry feet afford better blood circulation, which allows you to handle the cold better, and helps minimize the chance of blisters. Do not use waterbased creams for your feet since the water in the cream can freeze and cause frostbite at low temperatures.

**Did you know**
...During its lifetime, an average foot goes four laps around the earth. That's around 8000 to 10000 steps each day.
...Each foot has 26 bones, which accounts for one fourth of all bones in the body.
...Hypothermia, the state when an organism's temperature drops below that required for normal metabolism and bodily functions, starts occurring at 35 °C (95 °F), just a couple of degrees off of the body's normal temperature.
...Women are often colder than men. This is because, in general, men have greater muscle mass, which gives them better blood circulation and creates more body heat.
...The Inuit way to test body temperature and hand function is to press your little finger against your thumb. If you cannot do this, it is a sign of overall loss of body temperature and/or a risk of localized frostbite.

**Believe it or Not**
...There are theories that link cold feet and colds. The small hairs in our noses are always moving in order to transport foreign particles. The theories say that cold feet result in slower movements of our nose hairs, which makes it easier for viruses to get into the mucous membrane of the nose.
...In notes from Swedish monasteries from the 15th to the mid-16th centuries you can read: “For frostbite in leg and feet: burn old shoes to ashes, grind the powder and pour into sores and blisters, it will heal well. For frostbite in the feet: rub with bear fat, it will heal them. When cold feet: boil beets well, finely mash them and place on the wounds, it will heal and help.”
...One intriguing tip to increase the blood flow in your feet is to mix a dash of cayenne pepper with talcum powder, baking soda or flour and carefully brush it on to your feet.
Wool – nature’s own technical material.

Socks can be made of different materials and, in addition, from a number of combination of materials. Each material and material combination has its own unique function where the goal might be not only insulation and warmth, but also durability, moisture transport, odor elimination, comfort, looks, washability or price.

**Cotton.** Most socks in the world are made of cotton or cotton mixed with some kind of synthetic material. Cotton is a good fiber in many ways; it is soft against the skin, easy to wash and most importantly it is quite cheap. But cotton has an almost nonexistent ability to transport moisture, and when it is moist it quickly becomes cold.

**Synthetic.** Synthetic fibers are good at transporting moisture but do not provide warmth when it is cold. Synthetic fibers, which are petroleum-based, are often strong and durable, so adding a small amount of synthetics can add resilience and longevity.

**Merino wool.** Wool is nature’s own technical material, and to this day there is no way to produce a man-made fiber that has the same unique functionality as wool. Wool has many characteristics that makes it optimal in both socks and underwear.

**Optimal insulation.** The wool fiber’s crimped structure traps large quantities of air and provides good insulation. The air between the fibers reduces the conduction of heat in the material and thus has an insulating effect against both heat and cold. The crimps in the fibers also mean that there are fewer contact points between the material and the skin, another benefit when it comes to trapping air.

**Warms even when wet.** Wool is hygroscopic, meaning it can absorb moisture from the air as well as from the body. It actively works to absorb moisture and transport it through the material until a balance is achieved inside and outside the wool garment. The wool can absorb moisture both between and inside the fibers, which makes the wool against the skin feel dry even when it is moist. The wool fiber can absorb 30% of its own weight in moisture without feeling moist. Wool is also unique in that it can create warmth when moist: when moisture is absorbed, absorption-heat is created.

**Wool does not smell,** so it is especially suitable in socks. Wool is self-cleaning and does not easily hold odors. The creatine in the wool naturally breaks down bad smelling bacteria from the skin. In addition the fiber surface of the wool is water-repellent so there will be less bacteria growth and thus less odor.
Merino Sheep produce an exceptionally fine, crimped wool fiber, which increases wool's advantages.
Ullfrotté Original has a triple insulating effect since it can trap a remarkable amount of air, not only in the wool fibers themselves, but also in the material’s terry loops and in its open-knit construction.
Ullfrotté Original.

**Ullfrotté Original** is the material developed by Woolpower AB in Östersund in the early 1970’s in collaboration with the Swedish military, scientists, doctors and survival experts. The textile is highly wear resistant and consists of fine Merino wool, Polyamide/Polyester and air.

**Ullfrotté Original is 80% air.** The material is knit so that one side is smooth, and the other has terry loops. The material’s lofty terry loops, in combination with its crimpy wool fibers, forms a knitwear capable of trapping a lot of air. Up to 80% of the material actually consists of air, which means that the material has an excellent capacity to insulate body heat. The more air you can keep still around the body, the more heat you can retain.

Air does not to any large extent transport heat away from the body, but textiles do. The lofty knitwear has few contact points with the body, which reduces the number of points where body heat can be wicked away.

The permeable material easily lets out moisture from the body. As you become hot and you perspire, pressure builds up inside the clothes. The moisture molecules strive to get outside where the air is colder and the pressure lower. If the material is loose and the fibers have the right properties, they will help transport moisture away from the body. The capacity to transport moisture facilitates the radiation of heat during physical activities and helps keep the body dry and in balance.

**Wool in the yarn comes from Merino sheep.** The Merino wool is known as a very fine, soft and crimpy wool and is perfect for garments worn next to the skin. The wool used in Ullfrotté Original is 22 microns, meaning that the thickness of the wool fibers is 22 thousandths of a millimeter. This results in a comfortable material with sufficient tensile strength.

**The material is hardwearing.** Wool is a material with excellent properties but its wear resistance is not optimal. In order to add maximum wear resistance to the material, the wool has been mixed with one third polyamide. In the thinnest garments, polyester is added on the outside, for best possible wear resistance.

**Washing.** Wool is remarkably self-cleaning and does not retain odor even after long periods of use. This means that garments made in Ullfrotte Original do not need to
be washed as frequently as other materials, which is also good from an environmental standpoint.

When needed, the material can be washed at 60 °C (140 °F) and tumble-dried at medium heat. Humid conditions promote bacteria growth and certain soil bacteria will not die until the garments are washed at 60 °C (140 °F).

**Wool is hard to ignite** and only catches fire at very high temperature. Wool is based on protein, which in itself is a fire deterrent, and its property of trapping vapor also contributes. Once wool catches fire, the flame is not fed, but the fibers are charred and the fire dies. Since Ullfrotté Original consists mainly of wool, it is not a very flammable material, in contrast to purely synthetic products.

**Ullfrotté Original is certified by Öko-Tex.** Öko-Tex is an international human-ecology label that shows that the garments contain no toxic or harmful substances.
**Made in Östersund.**

**Woolpower AB was founded in Östersund in 1969** to produce nylon stockings. In the early 1970s, Ullfrotté Original was developed in collaboration with the Swedish military. The first Ullfrotté garments were produced in 1972.

Woolpower AB is owned by Gränsfors Bruks Moderbolag, a family-owned firm consisting of a group of small manufacturing companies. The products manufactured include crowbars, axes and protective clothes for forestry workers.

Woolpower AB is fully committed to the production of socks, base-layers and accessories. The company employs about 50 people and the entire production, from yarn to finished garments, takes place in Östersund, in the northern part of Sweden. Approximately 70% of the sales are exported to about 30 countries around the world.

The Woolpower manufacturing facility has earned both ISO-9001 and ISO-14001 certifications for quality and environmental management, respectively.
Woolpower socks are available in five different thicknesses: A thin liner weight, 200, 400, 600 and 800 g/m². The socks can be combined in different ways depending on temperature and activity.
Woolpower Liner – thin socks without terry loops.

The liner is a thin sock to be worn closest to the foot. It absorbs moisture from the foot and transports it to the next layer while at the same time preventing blisters. The liner sock can be used in combination with a thicker sock when it is cold, or as a thin sock for any occasion. It is simply a regular, comfortable sock.

**SHOE LINER**
Item No: 8401
A thin, smooth-knit, short sock with elastane for a comfortable fit. Integrated toe seam. Logo and size information is stitched into the sock.
60% Merino Wool, 35% Polyamide, 5% Elastane
Size: 36-48

**LINER CLASSIC**
Item No: 8411
A thin, smooth-knit, medium length sock with elastane for a comfortable fit. Integrated toe seam. Logo and size information is stitched into the sock.
60% Merino Wool, 35% Polyamide, 5% Elastane
Size: 36-48

**LINER KNEE-HIGH**
Item No: 8481
A thin, smooth-knit, knee-high sock with elastane for comfortable fit. Integrated toe seam. Logo and size information is stitched into the sock.
60% Merino Wool, 35% Polyamide, 5% Elastane
Size: 36-48
Woolpower Socks 200 g/m²

Our thinnest terry-loop knit socks are designed to be worn next to the skin in order to insulate. These can be combined with thicker socks, as well. The material will keep the feet comfortably warm while simultaneously transporting moisture. These socks work well in the summer.

SOCKS 200
Item No: 8412
Insulating ullfrotté in the foot and a rib-knit shaft for good fit.
50% Merino Wool, 45% Polyamide, 5% Elastane
Available for KIDS.
Size: 19-48

SOCKS KNEE-HIGH 200
Item No: 8482
Knee-high sock with insulating ullfrotté in both foot and shaft.
60% Merino Wool, 40% Polyamide
Size: 36-48
**Woolpower Socks 400 g/m²**

A thicker sock that offers more insulation when worn over a liner sock. It absorbs and transports moisture that comes from the liner. It also works well as a base layer sock when double socks are not needed.

**SOCKS 400**
Item No: 8414
Insulating ullfrotté in the foot and shaft. Elastic in the ankle and shaft.
64% Merino Wool, 36% Polyamide
Available in FR with 70% Merino Wool, 18% Polyamide, 12% Aramide.
Item No: 8465
Size: 36-48

**SOCKS LOGO 400**
Item No: 8424
Insulating ullfrotté in the foot and a rib-knitted shaft for good fit. Knitted logo.
64% Merino Wool, 32% Polyamide, 4% Elastane
Available for KIDS.
Size: 19-48

**SOCKS KNEE-HIGH 400**
Item No: 8424
Insulating ullfrotté in the foot and a rib-knitted shaft for good fit. Knitted logo.
64% Merino Wool, 32% Polyamide, 4% Elastane
Available for KIDS. Size: 19-48
Woolpower Socks 600–800 g/m²

A thicker sock that offers substantially more insulation when worn over a liner sock. It is especially effective in lower temperatures, and it makes a comfortable sock indoors or in your tent when you have cold feet.

SOCKS 600
Item No: 8416
Sock with ullfrotté in both foot and shaft. Elastic in the ankle and shaft.
60% Merino Wool, 40% Polyamide
Available in FR with 70% Merino Wool, 18% Polyamide, 12% Aramide. Article No: 8466. Size: 36-48.

SOCKS KNEE-HIGH 600
Item No: 8486
Knee-high sock with ullfrotté in both the foot and shaft.
60% Merino Wool, 40% Polyamide
Available in FR with 70% Merino Wool, 18% Polyamide, 12% Aramide. Article No: 8496. Size: 36-48.

SOCKS BRUSHED 600
Item No: 8456
Sock with both foot and shaft in terry loop knit that has been brushed for a soft, extra comfortable surface. The brushed side should be worn against the skin.

SOCKS 800
Item No: 8418
Sock with ullfrotte in both foot and shaft.
Colors and Sizes.

Four colors. Woolpower socks are available in four colors for adults (black, navy, grey and green). Some versions of socks are available only in select colors.

Washing. Woolpower socks can be washed in 60 °C (140 °F) and tumble dried on medium heat.

Sizing chart:

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FR- special collection of Flame Resistant socks. Aramide fibers are added to the wool, further reinforcing the capacity to withstand heat and fire. These products are marked FR (Flame Resistant) and are CE marked in accordance with the requirements for this kind of protective clothing. Woolpower FR is only available in black.

KIDS – socks for children. Children often combine high activity levels with rested and sitting play, so high demands are put on comfort and warm feet. Children also have larger skin surface area in relation to their body mass, which leads to faster cooling when exposed to cold weather.

Woolpower KIDS are available in light blue, red, light green and black.

Sizes KIDS socks:
Woolpower Products.

Woolpower is a whole collection of garments for the entire body that can be combined in various ways depending on temperature and type of activity.

In addition to socks, Woolpower AB produces base layers, mid layers and accessories. Check all garments at www.woolpower.se. Some examples:

Credits.

Sources and Inspiration

Photo
Gösta Fries, Johanna Moberg, Anna Boetto, Fredrik Sträng, Mimbild and Tommy Andersson.

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COLD FEET?
About keeping warm and comfortable feet.
And about socks from Woolpower.

From Woolpower AB, who produces warm socks, base layers and mid layers from Ullfrotté Original, the company’s proprietary terry loop knit, fine Merino wool material.
Made in Sweden since 1972, the company’s garments are sold all over the world under the Woolpower brand name.

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