Welcome to MTT Jokioinen!

MTT Agrifood Research Finland is a leading research institute developing responsibility, competitiveness and sustainable use of land resources in the food system. Operating under the Ministry of Agriculture and Forestry, MTT employs around 760 people at 15 locations across Finland. In 2011, the expenditure totalled approximately EUR 56.7 million, of which 58 % was budget financing.

We conduct research within five research areas permeating the entire organization. The program-based approach enables genuine multidisciplinary research, which is a requirement for efficient problem-solving. The MTT research areas are:

- Sustainable and competitive food production
- Responsible food chain – better consumer well-being
- Environmental-friendly agriculture
- Green economy opportunities
- Smartly from renewable resources

The MTT head office is situated at Jokioinen, a 1.5-hour drive from Helsinki. Approximately half of the staff works there. The administration is mainly located there as well as research departments in Animal Production, Plant Production and Biotechnology and Food Research. Agricultural Economics is situated in Helsinki and Agricultural technology in Vihti.

Among many experimental infrastructures, MTT has experimental fields at several locations around Finland and two dairy barns (Jokioinen and Maaninka) with modern experimental facilities. Ensiling experiments are also mainly located on these sites. A facility for growing cattle is currently under construction in Ruukki.

For more information on MTT, please visit our website: [www.mtt.fi/ english](http://www.mtt.fi/english)

Interested in Silage Research? Check: [www.mtt.fi/silageresearch](http://www.mtt.fi/silageresearch)
Elonkierto Agricultural Exhibition Park

Elonkierto is a rural and domestic animal exhibition park established by MTT Agrifood Research Finland by EU Life funds in 1998. Elonkierto shows how man and nature work together. Elonkierto lies deep in the ancient rural landscape of Häme region. Cows, horses and sheep graze in the park from the beginning of June until mid-September. The Elonkierto Tour follows a 2 km (1.2 miles) path. It starts with the history of agriculture in small fields surrounded by traditional rail fences.

Please do not feed or touch the animals in Elonkierto!
A detailed Guide about Elonkierto is available at:
Main MTT Experimental Infrastructures

Arable land around Finland in total of 1,639 hectares. The fields are used for plant and feed production experiments, for official variety trials and to produce feeds for the experimental herds.

Two modern loose-house experimental dairy barns (individual feed intake measurements)
- Maaninka (Eastern Finland) for 120 cows with a specific emphasis on feeding systems and precision dairy farming
- Jokioinen for 134 cows with specific emphasis on fertility and embryo technologies as well as GHG measurements and mitigation

Growing Cattle – a new facility for growing cattle under construction in Ruukki (Northern Finland)

Pigs (Hyvinkää), horses (Ypäjä), chicken (Jokioinen) and fur animals (Kannus) are also used in research.

Additional experimentation is conducted in cooperation with practical farmers both in plant and animal production.

Biogas research
- Farm-scale biogas plant (Maaninka)
- Research biogas reactor (Sotkamo)
- Laboratory-scale research platform (Jokioinen)

Measuring equipment and environments (Vihti))
- Machine and equipment research and test environment: hall, field and forest environments
- Test of safety, functionality and usability
- Environmental conditions facility (-40 - +60)

Horticulture and greenhouse production research (Piikkiö and Laukaa)

Genome research facilities and laboratory services for soil, plant, animal and food research (Jokioinen)

MTT operates at 15 locations
MTT Maaninka Dairy Barn was taken into use in 2009 and has a special focus on precision dairy farming. It also provides good facilities for feeding experiments.

Photo: Auvo Sairanen.

Biogas production offers new opportunities for solving the energy questions of future. MTT Maaninka has a farm scale biogas plant in conjunction to the dairy barn.

Photo: Marketta Rinne.
Visit Guide at MTT on 3 July 2012

During the visit at MTT, you are welcome to freely wander around the Campus area. The Map will help you find interesting spots.

Coffee is served during the whole visit in Tietotalo (1). Help yourself!

There will be a shuttle bus between Tietotalo P1 and Elonkierto P2 according to the following schedule:
- Tietotalo to Elonkierto: 14:15, 14:45, 15:15, 15:45, 16:15
- Elonkierto to Tietotalo: 14:30, 15:00, 15:30, 16:00, 16:30

Please note that the buses must leave from Jokioinen at 17:45 sharp to allow us to be on time for the Conference Dinner. All busses leave from Tietotalo (P1) and everybody needs to go into the same bus which they originally used.

Short (10 min.) oral presentations are given at the following times in Tietotalo upstairs:
- 14:30 Ilkka P. Laurila: General MTT Introduction
- 15:00 Perttu Virkajärvi: Grass crop physiology in focus at MTT
- 15:30 Johanna Vilkki: Dairy cattle nutrigenomics at MTT
- 16:00 Arja Seppälä: Grass biomass for bioenergy at MTT
- 16:30 Ilkka P. Laurila: General MTT Introduction (repetition from 14:30)

MTT Researchers will be available at various spots. Check the detailed Guide for more information.
- Tietotalo (1): Seppo Ahvenjärvi, Kaisa Kuoppala (dairy cow feeding)
- Grass plots (4): Oiva Niemeläinen
- Forage harvesting machinery (8): Antti Suokannas and Matts Nysand
- Finnsheep forest paddock (29): Juha Kantanen
- Elonkierto barn: Arja Seppälä, Elina Juutinen, Satu Ervasti, Elina Tampio (ensiling and biogas research, Maaninka dairy facility)

The ISC logo signs will guide you around the area. Use the opportunity to experience the Finnish summer nature and wander freely around the parks and forests! Note that although the mosquitoes make itching bites, they do not transmit diseases.

If you need help, call +358 50 5700 811 (Marketta Rinne).
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<thead>
<tr>
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<th>Description</th>
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<tr>
<td>1</td>
<td>Tietotalo. The previous dairy barn of the Jokioinen Estates has been converted into an “Information building”, which hosts MTT and Jokioinen municipality offices as well as private companies. The previous hay storage upstairs serves as a meeting room with programme and demonstrations for ISC delegates. Downstairs you can find MTT exhibition, and a meeting room and sauna which have been built in old-time round silage towers.</td>
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<td>2</td>
<td>Garden of Wendla shows traditional and genetically valuable decorative plants in a beautiful setting next to the old dairy barn.</td>
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<td>3</td>
<td>A tenant farmer statue. Tenant farming was common in Finland from the 17th century until 1918, when a law was given stating that the tenant farmers had a right to claim the land to themselves.</td>
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<td>4</td>
<td>Plots of different grass species (at flowering stage): Timothy, Meadow fescue, Tall fescue, Festulolium, Perennial ryegrass and Cocksfoot. Also plots of direct drilled red clover into old grass sward. Oiva Niemeläinen is at the trial site to inform about the species at 15:30 – 16:00. Additional plots of grass-legume mixtures for bioenergy (for biogas) production can be viewed together with Oiva Niemeläinen after 16:00. Mixtures include Goat’s rue, Reed canary grass, Alfalfa, Timothy and Red clover.</td>
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<td>5</td>
<td>Old grain storage made using the traditional log building technique. Serves currently as a summer art gallery. Free entrance.</td>
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<td>6</td>
<td>MTT Administration in the main building of Jokioinen Estates (no entrance)</td>
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<td>7</td>
<td>Apple tree varieties and other plants marked with labels in the Park</td>
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<td>8</td>
<td>Tennis court</td>
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<td>9</td>
<td>Path to the grave of Willebrand, one of the most important previous owners of Jokioinen Estates. Path continues to Smoke Sauna.</td>
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<td>10</td>
<td>Route to Elonkierto Park</td>
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<td>11</td>
<td>Elonkierto Agricultural Exhibition Park features both past and present of Finnish agriculture. It also introduces research that is carried out at MTT. The idea is to tell about research in a more concrete way than just through papers and Power Point presentations. The total area is about 20 hectares. Within the park area there is a 2 km long introductory path for visitors (you can also take a short-cut!). The path starts with the history of agriculture in small fields surrounded by traditional rail fences, and ends with a view to the future of agriculture. The park is open for public free of charge, every day from the end of May to the middle of September.</td>
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<td>12</td>
<td>The history part of Elonkierto tells about farming in Finland from the 17th to the 19th century. Some of the most commonly cultivated plants and crop rotations are presented. On the left side of the path you can see traditional medicinal herbs</td>
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and after them on the left side corner there is a field of small tobacco (*Nicotiana rustica*). On the right side of the path are hop poles. Hop was needed for brewing beer. In the shade of the tobacco field, there’s a hennery with Finnish native breed chickens.

| 13 | MTT farm forage harvesting machinery and demonstration of silage additive application (Matts Nysand and Antti Suokannas) |
| 14 | A field demonstrating the traditional slash-and-burn farming method. Rye and turnips were the most typical crops grown on burn-beaten land. The path continues to Smoke Sauna. |
| 15 | Smoke sauna, the traditional chimneyless type of sauna which is not very common any more. Most Finnish homes, even in many blocks of flats, are equipped with saunas, but they have chimneys, or are heated by electricity. |
| 16 | Outside Fireplace, coffee made on fire. A good place to take a view to the Loimijoki river. The clay soils around the area make the water opaque. |
| 17 | Finncattle graze the river valley. In the pasture there is one Western Finnish and three Eastern Finnish cows. Eastern Finnish cow is called ‘kyyttö’ and it has reddish brown sides and a white back and underbelly. The Western Finnish cow is uniformly reddish brown. The three original Finnish breeds were in danger of extinction during the past decades. There are just barely over 200 purebred animals of the Eastern Finnish breed left. Equally rare is the Lapland cow. The most common native breed is the uniformly reddish brown Western Finnish cow. The native cattle are usually hornless. |
| 18 | Finnish soil types and the pH demonstration. MTT has a long tradition in soil research and has developed the soil fertility analysis for Finnish conditions. |
| 19 | Nitrogen (N) is often the most growth limiting factor for plants. The nitrogen cycle demonstrates how nitrogen finds its way to our table and the environment. The amount of available nitrogen in soil varies during the growing season as a result of fertilization, soil microbe activity, nitrogen uptake by plants and various losses. The path demonstrates what happens to the nitrogen that is present in soil and given in fertilizers during a year. There is 3.5 fertilizer bags of 40 kg, the nitrogen content in these bags is 20 %, 28 kg. This amount is needed for a Finnish “average consumer” field of 0.3 hectares. The path starts in May when nitrogen fertilizers are applied to fields, and ends in April of the following year. One meter width along the path and in the field equals 10 kg of nitrogen. The incoming tracks joining the path represent additional nitrogen input that is available to plants, and correspondingly the outgoing tracks represent nitrogen losses. The width of the cereal growth around the path indicates the amount of nitrogen taken up by the plants and the yield. The end of the cycle shows, what happens to the nitrogen used by the plants after harvesting. |
The short history of phosphorus (P) fertilization and the related research from the 1940’s up to 2010 are briefly reviewed.

Finland is the northernmost agricultural country in the world. Plant production is limited by low temperatures, a short growing season and, in some parts, by summer frosts. In southern Finland, lack of water is also often a growth-limiting factor. The natural conditions for plant production get harsher towards the north, and the country is divided into cultivation zones based on the climate (see map on the label). Growing wheat for baking is possible in the two southernmost zones (zones I and II), zones III and IV are suitable for growing cereals for feed (barley and oats), but in the northernmost zone (zone V), only grass production is successful. Elonkierto begins its introduction to Finnish cultivated plants with cereals, followed by the pulses, oil plants, fibre plants, buckwheat and winter grains. First cultivars in the demonstration area are old ones that are not cultivated anymore. These are followed by currently cultivated cultivars, which have been bred for specific purposes. The last cultivars are for future years.

Weed demonstration

A demonstration area for chemical cleaning of runoff waters. The method is developed at MTT. It can be used to clean solid matter and water-soluble phosphorus from field runoff water. In this method, soil matter in water is crumbled by using positively charged and slightly acid low-molecular-weight aluminum hydroxide polymers. Water-soluble phosphorus binds to oxides that are inside the formed soil crumbs, and it changes into a form that is unusable to algae. In practice aluminum hydroxide polymer solution is measured into the dammed pool to which the main ditch drains. There phosphorus binds to oxides inside clay particles and settles down on the bottom of the pool with the solid matter. To clean all runoff waters from Finnish fields with this method would cost about 70-100 million euros.

Climate change demonstration. It is estimated that the Earth’s surface temperature will increase by 1.4-5.8 °C by year 2100. The greenhouse shows how the climate change would affect the Finnish agriculture. On the right side there are some plants which would benefit from the warmer temperature and on left side there are some plants which could not be cultivated even after temperature rise, mainly due to the long photoperiod during the summer in the North. Behind the greenhouse the demonstration describes how the agriculture contributes to climate change and how it could be mitigated.

Goats

Finnish dining table. The cultivated field area in Finland is about 2.3 milj. hectares, which results in about 0.4 ha per capita. Elonkierto dining table demonstrates what is grown in Finnish fields and how much field area is needed to produce raw materials per one average Finnish consumer. The area is bordered by the white wooden posts. The right side of the path is used for feeds.
for animals to produce milk, meat and eggs. On the left side there are the directly edible plants such cereals, vegetables, rapeseed for oil and sugar beet. Fallow area, non-food production plants and plants for export are also represented.

27 Elonkierto barn with demonstrations on ensiling experiments and biogas research with a special emphasis on MTT Maaninka dairy cow and biogas facilities. A number of MTT researchers present. A clamp silo filled with silage next to the barn.

28 A path through meadow with wild flowers

29 Proliferic Finnsheep ewes. Juha Kantanen tells about their unique genetic background.

30 Summer shelter in a small forest

31 Finnish Ayrshire heifers on pasture.

32 Horses on pasture

33 Milk loading stage, collection place for milk cans before the era of milk tank trucks

34 Two possible future scenarios for Finnish agriculture. What could Finnish agriculture and the rural landscape look like in the future? Researchers, policy makers and farmers will affect the direction of development, but the future of the countryside and the food industry will ultimately be affected by consumers through their purchasing decisions. Two different trends are demonstrated on the path to the future. The left side describes a development where the conditions for Finnish agriculture have further weakened while the right side visions a positive future trend for Finnish agriculture.

35 Pigs

36 Experimental plots

37 Toilets

P1 Bus stop at Tietotalo (in the behind of the building)
P2 Bus stop at Elonkierto barn

MTT Office and Laboratory Buildings (no entrance)
A Alimentum - Biotechnology and Food Research
B Datum – Library, IT
C Animale - Animal Production Research
D Planta - Plant Production Research
Silage is produced at the MTT fields to feed the experimental herds, and to conduct research on various aspects of silage production. Photo: Eeva Saarisalo
Guide for XVI International Silage Conference visitors on 3 July 2012
- MTT Jokioinen Campus
- Elonkierto Agricultural Exhibition Park

www.mtt.fi/english