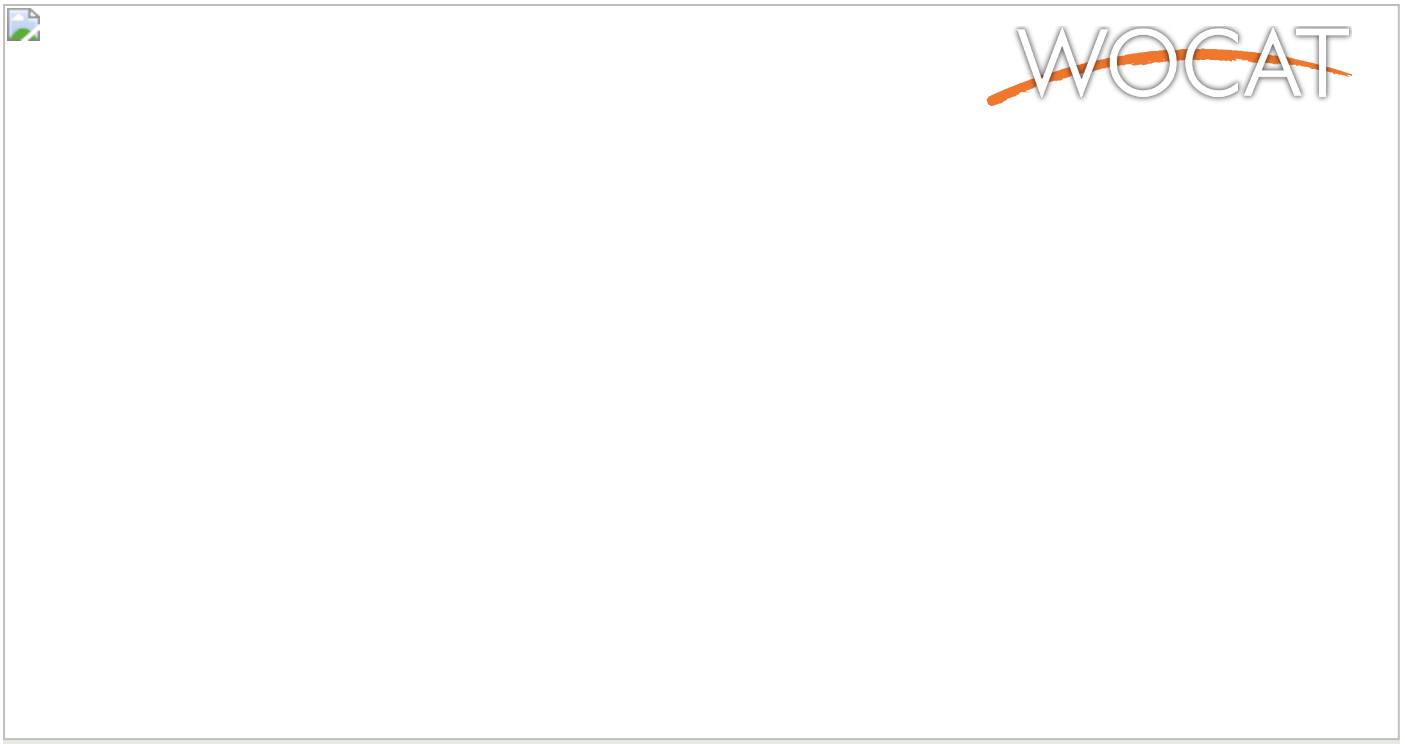

(Giovanni Quaranta)

# Pasture manuring (application of manure from shelter) (Italy)

## DESCRIPTION

**Application of manure in valuable pastures to increase grass recover and reduce shrub encroachment**

This is a technique used on animal husbandry farms with either deep litter housing systems (sheep and goat manure) or manure heaps (cattle manure). Manure spreading is carried out twice a year but on different land.
In the case of deep litter housing systems fresh straw is continuously spread over soiled litter in layers. After around six months the deep litter bedding is removed and mechanically spread on pasture lands or arable land.
In the case of cattle farms animal waste is transferred daily to the farm's manure heap where it is left to decompose for at least a year. Also in this case straw is added for the animals' comfort and hygiene and is added to the manure heap together with faeces.
Once the manure is ready it is spread on areas of land which can be farmed using mechanical means In the case of arable cropland manure is immediately buried by ploughing, in the case of pasture land it is spread at the beginning of autumn and left on the surface without ploughing (if not occasionally a harrow might be used to break down the manure to increase even distribution and penetration).

Purpose of the Technology: Increase growth of palatable species, increase value of grazing area

Natural / human environment: The technique is an agronomic measure which is applied on meadows, pastures and cropland in an area with a sub-humid climate, moderate scope and shallow clayey soil.
As to the context of production, it is characterised by a medium level of mechanisation (only the most demanding operations are carried out using mechanical means), the production system is essentially mixed, a small part is destined for personal consumption whilst the bulk of production is destined for local markets. The property is predominantly privately owned but also includes some public land, especially in the case of pasture land. Most farms in the area are livestock farms whilst the agricultural component is destined exclusively for private consumption.

## LOCATION

**Location:** Castelsaraceno, Basilicata, Italy

**No. of Technology sites analysed:**

**Geo-reference of selected sites**
- n.a.

**Spread of the Technology:** evenly spread over an area (approx. 0.1-1 km2)

**In a permanently protected area?:**

**Date of implementation:** more than 50 years ago (traditional)

**Type of introduction**
- [ ] through land users' innovation
- [x] as part of a traditional system (> 50 years)
- [ ] during experiments/ research
- [ ] through projects/ external interventions

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## CLASSIFICATION OF THE TECHNOLOGY

### Main purpose

- improve production
- reduce, prevent, restore land degradation
- conserve ecosystem
- protect a watershed/ downstream areas – in combination with other Technologies
- preserve/ improve biodiversity
- reduce risk of disasters
- adapt to climate change/ extremes and its impacts
- mitigate climate change and its impacts
- create beneficial economic impact
- create beneficial social impact

### Land use

Land use mixed within the same land unit: Ja - Agro-pastoralism (incl. integrated crop-livestock)

**Cropland**

- Annual cropping

Number of growing seasons per year: 1

**Grazing land**

- Semi-nomadic pastoralism
- Ranching

Animal type: goats, sheep, cows

### Water supply

- rainfed
- mixed rainfed-irrigated
- full irrigation

### Purpose related to land degradation

- ☑ prevent land degradation
- reduce land degradation
- restore/ rehabilitate severely degraded land
- adapt to land degradation
- not applicable

### Degradation addressed

**biological degradation** - Bs: quality and species composition/ diversity decline, Bl: loss of soil life

### SLM group

- integrated soil fertility management

### SLM measures

**agronomic measures** - A2: Organic matter/ soil fertility

## TECHNICAL DRAWING

### Technical specifications

## ESTABLISHMENT AND MAINTENANCE: ACTIVITIES, INPUTS AND COSTS

### Calculation of inputs and costs

- Costs are calculated:
- Currency used for cost calculation: **euro**
- Exchange rate (to USD): 1 USD = 0.74 euro
- Average wage cost of hired labour per day: 81.08

### Most important factors affecting the costs

Assuming that the production of manure (as described above) happens on farm, the critical point of the application of the technique is the availability of equipment for spreading. The largest farms buy the equipment spending from 35,000 to 40,000 euro depending on the machines' working capacities. The smaller farms (which represent the vast majority) rent this equipment (from third parties) twice a year at an overall cost of around €70 an hour.

### Establishment activities

n.a.

### Maintenance activities

1. Emptying of deep litter bedding or manure hap (Timing/ frequency: 2 per year)
2. Spreading of manure on 3 hectares of pasture land (Timing/ frequency: 2 per year)
3. Hire of manure spreader (Timing/ frequency: 2 per year)

Maintenance inputs and costs

| Specify input | Unit | Quantity | Costs per Unit (euro) | Total costs per input (euro) | % of costs borne by land users |
|---|---|---|---|---|---|
| **Labour** | | | | | |
| Emptying of deep litter bedding or manure hap | ha | 1.0 | 324.3 | 324.3 | 100.0 |
| Spreading of manure on 3 hectares of pasture land | ha | 3.0 | 972.9 | 2918.7 | 100.0 |
| Hire of manure spreader | ha | 1.0 | 283.78 | 283.78 | 100.0 |
| **Total costs for maintenance of the Technology** | | | | **3'526.78** | |
| *Total costs for maintenance of the Technology in USD* | | | | *4'765.92* | |

## NATURAL ENVIRONMENT

### Average annual rainfall
- [ ] < 250 mm
- [ ] 251-500 mm
- [ ] 501-750 mm
- [ ] 751-1,000 mm
- [x] 1,001-1,500 mm
- [ ] 1,501-2,000 mm
- [ ] 2,001-3,000 mm
- [ ] 3,001-4,000 mm
- [ ] > 4,000 mm

### Agro-climatic zone
- [ ] humid
- [x] sub-humid
- [ ] semi-arid
- [ ] arid

### Specifications on climate
68% in winter and 15% in summer
Thermal climate class: temperate

### Slope
- [ ] flat (0-2%)
- [x] gentle (3-5%)
- [x] moderate (6-10%)
- [ ] rolling (11-15%)
- [ ] hilly (16-30%)
- [ ] steep (31-60%)
- [ ] very steep (>60%)

### Landforms
- [ ] plateau/plains
- [ ] ridges
- [x] mountain slopes
- [x] hill slopes
- [ ] footslopes
- [ ] valley floors

### Altitude
- [ ] 0-100 m a.s.l.
- [ ] 101-500 m a.s.l.
- [ ] 501-1,000 m a.s.l.
- [x] 1,001-1,500 m a.s.l.
- [x] 1,501-2,000 m a.s.l.
- [ ] 2,001-2,500 m a.s.l.
- [ ] 2,501-3,000 m a.s.l.
- [ ] 3,001-4,000 m a.s.l.
- [ ] > 4,000 m a.s.l.

### Technology is applied in
- [ ] convex situations
- [ ] concave situations
- [ ] not relevant

### Soil depth
- [ ] very shallow (0-20 cm)
- [x] shallow (21-50 cm)
- [x] moderately deep (51-80 cm)
- [ ] deep (81-120 cm)
- [ ] very deep (> 120 cm)

### Soil texture (topsoil)
- [ ] coarse/ light (sandy)
- [ ] medium (loamy, silty)
- [x] fine/ heavy (clay)

### Soil texture (> 20 cm below surface)
- [ ] coarse/ light (sandy)
- [ ] medium (loamy, silty)
- [ ] fine/ heavy (clay)

### Topsoil organic matter content
- [ ] high (>3%)
- [x] medium (1-3%)
- [ ] low (<1%)

### Groundwater table
- [ ] on surface
- [ ] < 5 m
- [x] 5-50 m
- [ ] > 50 m

### Availability of surface water
- [ ] excess
- [ ] good
- [x] medium
- [ ] poor/ none

### Water quality (untreated)
- [x] good drinking water
- [ ] poor drinking water (treatment required)
- [ ] for agricultural use only (irrigation)
- [ ] unusable

*Water quality refers to:*

### Is salinity a problem?
- [ ] Ja
- [ ] Nee

### Occurrence of flooding
- [ ] Ja
- [ ] Nee

### Species diversity
- [ ] high
- [x] medium
- [ ] low

### Habitat diversity
- [ ] high
- [ ] medium
- [ ] low

## CHARACTERISTICS OF LAND USERS APPLYING THE TECHNOLOGY

### Market orientation
- [ ] subsistence (self-supply)
- [ ] mixed (subsistence/ commercial)
- [x] commercial/ market

### Off-farm income
- [ ] less than 10% of all income
- [ ] 10-50% of all income
- [x] > 50% of all income

### Relative level of wealth
- [ ] very poor
- [ ] poor
- [x] average
- [ ] rich
- [ ] very rich

### Level of mechanization
- [ ] manual work
- [ ] animal traction
- [ ] mechanized/ motorized

### Sedentary or nomadic
- [ ] Sedentary
- [ ] Semi-nomadic
- [ ] Nomadic

### Individuals or groups
- [x] individual/ household
- [ ] groups/ community
- [ ] cooperative
- [ ] employee (company, government)

### Gender
- [ ] women
- [x] men

### Age
- [ ] children
- [ ] youth
- [ ] middle-aged
- [ ] elderly

### Area used per household

- [ ] < 0.5 ha
- [ ] 0.5-1 ha
- [ ] 1-2 ha
- [ ] 2-5 ha
- [ ] 5-15 ha
- [x] 15-50 ha
- [ ] 50-100 ha
- [ ] 100-500 ha
- [ ] 500-1,000 ha
- [ ] 1,000-10,000 ha
- [ ] > 10,000 ha

### Scale

- [x] small-scale
- [ ] medium-scale
- [ ] large-scale

### Land ownership

- [ ] state
- [ ] company
- [x] communal/ village
- [ ] group
- [ ] individual, not titled
- [x] individual, titled

### Land use rights

- [ ] open access (unorganized)
- [x] communal (organized)
- [ ] leased
- [x] individual

### Water use rights

- [ ] open access (unorganized)
- [ ] communal (organized)
- [ ] leased
- [ ] individual

### Access to services and infrastructure

| | | |
|---|---|---|
| health | poor | good |
| education | poor | good |
| technical assistance | poor | good |
| employment (e.g. off-farm) | poor | good |
| markets | poor | good |
| energy | poor | good |
| roads and transport | poor | good |
| drinking water and sanitation | poor | good |
| financial services | poor | good |

## IMPACTS

### Socio-economic impacts

| | | | |
|---|---|---|---|
| fodder production | decreased | increased | Quantity before SLM: 8t/ha<br>Quantity after SLM: 11t/ha |
| fodder quality | decreased | increased | The quality of the fodder increases due to the increase of protein content. |
| demand for irrigation water | increased | decreased | |
| farm income | decreased | increased | Net return from this activity increases due to yield increases. |

### Socio-cultural impacts

| | | |
|---|---|---|
| health situation | worsened | improved |
| conflict mitigation | worsened | improved |
| Improved livelihoods and human well-being | decreased | increased |

### Ecological impacts

| | | |
|---|---|---|
| surface runoff | increased | decreased |
| soil moisture | decreased | increased |
| soil loss | increased | decreased |
| soil crusting/ sealing | increased | reduced |
| soil compaction | increased | reduced |
| nutrient cycling/ recharge | decreased | increased |
| soil organic matter/ below ground C | decreased | increased |
| biomass/ above ground C | decreased | increased |
| plant diversity | decreased | increased |
| beneficial species (predators, earthworms, pollinators) | decreased | increased |
| habitat diversity | decreased | increased |
| pest/ disease control | decreased | increased |
| emission of carbon and greenhouse gases | increased | decreased |
| Benefits from soil ecology | decreased | increased |

The application of manure increases the soil organic matter content. As The application of manure increases the soil organic matter content. As well known the increases in organic matter content turns in important benefits from the soil ecology.

### Off-site impacts

| | | |
|---|---|---|
| reliable and stable stream flows in dry season (incl. low flows) | reduced | increased |

The application of manure due to its beneficial effects on soil parameters, allows to keep grass and crops healty along the year so protecting soil. Poor soils , without manure application, can not sustaine grasses all over the year making it at erosion

downstream flooding (undesired)

increased ✓ reduced

The application of manure due to its beneficial effects on soil parameters, allows to keep grass and crops healty along the year so protecting soil. Poor soils , without manure application, can not sustaine grasses all over the year making it at erosion

buffering/ filtering capacity (by soil, vegetation, wetlands)

reduced ✓ improved

The application of manure due to its beneficial effects on soil parameters, allows to keep grass and crops healty along the year so protecting soil. Poor soils , without manure application, can not sustaine grasses all over the year making it at erosion

## COST-BENEFIT ANALYSIS

**Benefits compared with establishment costs**

**Benefits compared with maintenance costs**

Short-term returns: very negative ✓ very positive

Long-term returns: very negative ✓ very positive

## CLIMATE CHANGE

**Gradual climate change**

annual temperature increase: not well at all ✓ very well

**Climate-related extremes (disasters)**

local rainstorm: not well at all ✓ very well

local windstorm: not well at all ✓ very well

drought: not well at all ✓ very well

general (river) flood: not well at all ✓ very well

**Other climate-related consequences**

reduced growing period: not well at all ✓ very well

## ADOPTION AND ADAPTATION

**Percentage of land users in the area who have adopted the Technology**

- single cases/ experimental
- 1-10%
- 11-50%
- > 50%

**Of all those who have adopted the Technology, how many have done so without receiving material incentives?**

- 0-10%
- 11-50%
- 51-90%
- ✓ 91-100%

**Has the Technology been modified recently to adapt to changing conditions?**

- Ja
- Nee

**To which changing conditions?**

- climatic change/ extremes
- changing markets
- labour availability (e.g. due to migration)

## CONCLUSIONS AND LESSONS LEARNT

**Strengths: land user's view**

- It's the only natural way to fertilize pasture and croplands. This avoids the use of chemical fertilizers and external inputs. This also provides great beneficial effects on the milk/meat quality through better grass.

  How can they be sustained / enhanced? Providing subsides both to machinery and organic production

**Strengths: compiler's or other key resource person's view**

- The farms try to concentrate their activities and so they try to improve local (close by) pastureland. The technology increases the grass productivity and so helping farms to reduce time of grazing.

  How can they be sustained / enhanced? Supporting ad hoc machinery and equipment.

**Weaknesses/ disadvantages/ risks: land user's viewhow to overcome**

- This is considered as a heavy work (mainly dirty). The use of machinery is the only way to implement it No way

**Weaknesses/ disadvantages/ risks: compiler's or other key resource person's viewhow to overcome**

- The technology is difficult to apply on very steep slope lands No way

## REFERENCES

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**Full description in the WOCAT database**
https://qcat.wocat.net/af/wocat/technologies/view/technologies_1209/

**Linked SLM data**
n.a.

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- Catastrophic shifts in drylands (EU-CASCADE)