

## POSSIBILITIES FOR THE PRODUCTION OF WOOL FROM SHEEP

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### Abstract

*The purpose of this study was to find solutions for unlocking the production of wool from sheep as an alternative to the use of insulation materials and traditional isolation to improve comfort index, which lead to decrease heat loss in winter, to reduce intake summer heat and provide a positive thermal balance inside the building. The research was conducted by the method of comparing the existing data in the literature on the technical features of main construction materials used for thermal insulation and construction noise. It also was a cost analysis and thermal insulation per unit area. Following the study observed that the coefficient of thermal conductivity value for wool sheep ( $\lambda$ ), is 0.0326 kcal / m · h · ° C, slightly higher than that of expanded polystyrene which has a value of 0.029 kcal / m · h · ° C and lower than for mineral wool that has a value of 0.060 kcal / m · h · ° C. Given the qualities of good isolation system of sheep's wool, it can be concluded that its use in construction may be one of the main options for recovery, given that national production of wool is purchased in a proportion rather reduced from producers.*

**Key words:** Building insulation, wool production, recovery

### INTRODUCTION

Bankruptcy of state enterprises which processed wool, intermediaries attack and absurd European standards of hygiene for milk products deters farmers to go ahead with a business as old as the world is. The money that flowed before '89 for shepherds, they could operate without material restrictions were suddenly depleted. Textile factories specializing in wool processing were closed and eiderdowns were long obsolete. The EU rules that require at country permits and other papers for peasants who ignore them, it leaves the producer with unsold merchandise. People have known for thousands of years that sheep's wool has excellent insulation qualities. Were used wool clothes, for centuries, so it may be surprising that it took us so long to consider wool a reliable isolation for buildings. [7]

### MATERIAL AND METHOD

The research was conducted by the method of comparing the existing data in the literature on the technical features of main construction materials used for thermal and phonic insulation. It also was made a cost analysis for thermal insulation per unit of area. Wool provides a constant efficiency. For example, if it is a rainy autumn, which increases the humidity all construction material, wool has the same efficiency. Wrinkled surface of wool fiber insulation makes an excellent phonic isolation medium. If the insulation is used exclusively for floor phonic isolation, thin layers may be applied, specially designed for this purpose, placed under the floor. (Photo 1 and Photo 2).

The costs of such ecological thermal insulating are compared with those made with mineral wool or polystyrene. Thermal conductivity according to EN 12 667:  $\lambda = 0.0326$  to  $0.0356$  W / mK depending on volumetric density. On the hygrometric point of view it acts in the same way.



Photo 1. Wool mattresses for wall thermal isolation



Photo 2. Wool mattresses for phonic isolation of the floor

## RESULTS AND DISCUSSIONS

Like a wool pullover insulation made of same material and attached to the walls of the

house will automatically adjust the temperature, so heating costs are considerably less (Photo 3).



Photo 3. Wool mattresses for thermal and phonic isolation



Wool is officially recognized from 2003 as construction material in the European Union, currently being used also on the Romanian market.

Wool due to good thermal conductivity coefficient (Table 1 and Figure 1) has two particularities in climate adjusting:

a) Constant efficiency: even if a rainy autumn increases humidity of all the construction elements, the wool has always the same efficiency, a very good insulation. Thru special structure of the fiber, their surfaces remain always dry, no matter what moisture level are. Thus the thermal conductivity all-over wool mattresses are almost excluded.

Hygroscopicity is property of wool to absorb different quantities of water vapor from the atmosphere. Water is stores in vacuols from the cortical layer. The amount

of absorbed water by wool and expressed as a percentage of absolute dry weight wool is humidity.

Humidity of wool is conditional on the one hand from humidity, temperature and air movement, and on the other from morphological and histological structure of wool fibers.

Maximum capacity of hygroscopicity is approximately 33%

b) Latent heat storage: wool uses moisture content of the fibers that can go up to 25%, as latent heat storage. Summer during the day, cooling by evaporation is achieved and heat from condensation is achieved during at night. Thus, despite the minimum weight, results a high thermal protection, and automatic climate regulation which seeks it's equal.

Table 1  
Value of thermal conduction coefficient ( $\lambda$ ) for different construction materials[2]

No.	Name of construction material	Thermal conductivity ( $\lambda$ ) kcal/m·h·°C
1.	Mineral wool 200 kg/m <sup>3</sup>	0.0600
2.	Glass wool 10 kg/m <sup>3</sup>	0.0500
3.	BCA 1000 kg/m <sup>3</sup>	0.3500
4.	BCA 300 kg/m <sup>3</sup>	0.1100
5.	Glass 2500 kg/m <sup>3</sup>	0.6500
6.	Reinforced concrete 2600 kg/m <sup>3</sup>	1.7500
7.	Concrete with vegetal aggregate (wood chips, sawdust, hemp flakes)600 kg/m <sup>3</sup>	0.1400
8.	Expanded polystyrene 10-30 kg/m <sup>3</sup>	0.029-0.037
9.	Extruded polystyrene 28-45 kg/m <sup>3</sup>	0.023-0.028
10.	Sheep wool mattresses (different weight)	0.0326- 0.0356

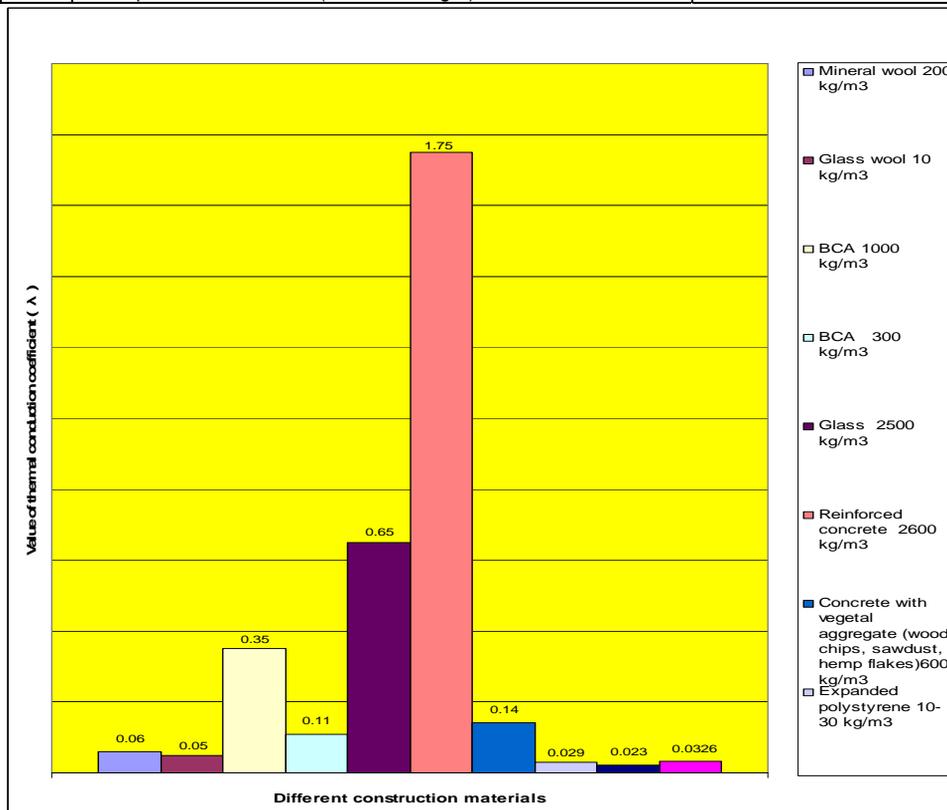


Figure 1 Graphic distribution of thermal conductivity coefficient ( $\lambda$ ) for various construction materials

Wool mattresses are manufactured in various widths and thicknesses, in shape of homogeneous fiber rolls that are easy to handle.

"Installation is very easy: it rolls, it clamps (fixed with tapestry staples) and then cut," explains Naturalpaint company experts [7]. Preferably, however, that insulation

would be included from the planning stages of construction and have to be installed on a wooden structure. If the walls are from brick first will apply a wooden frame and then the wool roll will be fixed. Wool as insulation system is recommended to be applied to the inside part. It can be put on the outside also

but very important in this case is good protection from rain.

"The cost of such a ecological thermal insulating are compared with those made with mineral wool or polystyrene. Depending

on the thickness and width of the mattresses used for wall claddings, and depending on quantity purchased, one square meter of wool can cost between 5 and 24 euros, "says Lukacs Lehel-Elek (Table 2).

Table 2  
Costs per m<sup>2</sup> of thermal isolation for various construction materials [5,6]

No	Name of construction material	€/ m <sup>2</sup>
1.	Basaltic mineral wool PLE 100 (0,6x1) 30kg/m3	3.44
2.	Expanded polystyrene (0,5x1)11 kg/m3	
	Weight 2cm	0.70
	Weight 3cm	1.05
	Weight 4cm	1.40
	Weight 5cm	1.76
	Weight 10cm	3.37
3.	Extruded polystyrene XPS (different weight) 600x1250 28-45 kg/m3	1.79-8.98
4.	Sheep wool mattresses (different weight)6]	5.00-24.00

## CONCLUSIONS

By buying wool from sheep farms, ensure their profitable one and by processing it in some factories can provide new jobs in Romania.

Wool provides good phonic isolation to the floor if is mounted undere the floor finishing element, achieving of a pleasant wall temperatures even during cold winters. Being 100% natural, wool is recommended for allergy and those with various lungs diseases. Using sheep wool for insulation leads to avoid the formation of mold on walls and floors, to a reduction in fuel and energy needs for heating and conditioning. Reducing fuel consumption and energy for heating and conditioning lowers costs. By reducing fuel consumption occurs also a reduction of

noxious emissions into the atmosphere, important for environmental protection;

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