Bringing Proteins to the market:
The case of alfalfa concentrated extracts

Focus on Luzixine, the LRD food grade specialty
**Alfalfa: an ancestral nutritional crop**

**Common Name:** Alfalfa, Lucerne

**Plant denomination:** Medicago Sativa L.

**Family:** Fabaceae - Pulses

**10 000 years of nutritional benefits**

**History of use:**
- Domesticated over 9000 years ago on the high plains of Caucasion, in Iran and in Turkey.

**Ethymology:**
- « Alfalfa », borrowed from the Arabic meaning « father of all foodstuffs » due to its nutritional richness
Alfalfa: a symbol of sustainable agriculture

- Highest protein per hectare
- Use of the whole plant by using co-products
- Almost no phytosanitary treatment: enriches the soil with nitrogen
- Prevention of soil erosion thanks to its root system
- Placement without tillage
- Purifying plant
- Protects biodiversity
  → Alfalfa cultivation contains a very rich microfauna and macrofauna that can be up to 100 times higher than wheat (1)

A MAGIC PLANT TO MEET TOMORROW’S PROTEIN DEMAND

(1) 2010: “Study on the enhancement of biodiversity on alfalfa - Measurement of differentiated crop management”, COOP de France Déshydratation, Muséum National d'Histoire Naturelle
## The alfalfa industry: French situation

<table>
<thead>
<tr>
<th>Country</th>
<th>Surfaces (en hectares)</th>
<th>Production (en million de t)</th>
<th>Nombre d’unités industrielles</th>
</tr>
</thead>
<tbody>
<tr>
<td>USA</td>
<td>7 500 000</td>
<td>55</td>
<td>13</td>
</tr>
<tr>
<td>Argentine</td>
<td>4 000 000</td>
<td>28</td>
<td>401</td>
</tr>
<tr>
<td>Canada</td>
<td>3 700 000</td>
<td>1,5</td>
<td>72</td>
</tr>
<tr>
<td>Chine</td>
<td>264 000</td>
<td>1,4</td>
<td>29</td>
</tr>
<tr>
<td>Espagne</td>
<td>141 000</td>
<td>1,4</td>
<td>30</td>
</tr>
<tr>
<td>France</td>
<td>65 000</td>
<td>0,83</td>
<td>29</td>
</tr>
<tr>
<td>Italie</td>
<td>80 000</td>
<td>0,71</td>
<td>30</td>
</tr>
<tr>
<td>Allemagne</td>
<td></td>
<td>0,25</td>
<td>38</td>
</tr>
</tbody>
</table>

Sources: CIDE/USDA/Statistique Canada/China Grassland Association.
The French alfalfa drying industry: keys figures

- 10,000 alfalfa producers in France
- 300,000 ha are farmed, with 80% of the production in France in Champagne-Ardenne
- 65,000 ha are intended to dehydration
- More than 1/3 of dehydrated alfalfa is exported

France is the 2nd European producing country, behind Spain.

Localization dehydration units
The French alfalfa drying industry: keys figures

82% Hectares* (figure 2018) in France are upgraded by 4 main regional alfalfa dehydration cooperatives located in « Grand Est area »
2 commercial companies, 2 expertises

- Luzéal
- Sundeshy
- TNA
- Capdéa

Dehydration Cooperatives

- R&D
- Trade/Supply chain

Market entry – Commercialization of the Luzixine on human nutrition market

Leading company on the market of dehydrated products intended for animal nutrition

Circular Bioeconomy Days – 27 June – Viborg - Denmark
Alfalfa outlets: product distribution

(sources: Désialis)

Specialty from alfalfa juice
1% of the global market (feed + food)

2018 figures

31% Bales
68% Pellets
1% CAE
CAE: main keys figures

- 7000 t/year
- Production in limited quantity
- From fresh alfalfa leaf juice
- Richness in various nutrients
- >50%
- High content in proteins
- Ability to produce CAE
- 2 plants in the world
- World exclusivity

Circular Bioeconomy Days – 27 June – Viborg - Denmark
Development origin of CAE, LRD and food applications

- Development of the process of leaf fractionation in the 1970s by will:
  - To diversify the products in order to conquer specific markets with higher added value
  - Save energy

- Creation of L-RD (Luzerne - Research and Development) in 2005:
  - to set up a common research structure in order to ensure the development of new products and the diversification of their outlets into future markets

- Development of alfalfa food applications is based on the industry's willingness to:
  - respond to environmental issues
  - respond to societal issues
The food grade process

Minimum eco-responsible process that concentrates the plant's nutrients

Process and ingredient approved by the EC in 2009 after 4 years of development
**Contains**

**Vegetable proteins** with high biological value:
- Richness in proteins

**Vitamins** including
- Source of vitamin B6, E, K
- Richness in **beta-carotene**, precursor of Vitamin A

**Minerals** including
- Richness in bioavailable iron
- Richness in calcium

**Fatty acids** including
- Excellent ratio $\omega_6 / \omega_3$ rebalancing the ratio in favor of $\omega_3$s.

- **Chemical score** = 108
- **Good protein digestibility** between 70 and 85%
- **PDCAAS** between 0.8 and 0.9

**NUTRITIONAL CONTENT**

<table>
<thead>
<tr>
<th>NUTRIENT</th>
<th>FOR 10G OF LUZIXINE*</th>
<th>% OF RDA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Proteins</td>
<td>5 - 6 g</td>
<td>-</td>
</tr>
<tr>
<td>Omega 3</td>
<td>350 mg</td>
<td>17.5 %</td>
</tr>
<tr>
<td>Vitamin A</td>
<td>917 ER</td>
<td>115 %</td>
</tr>
<tr>
<td>Vitamin E</td>
<td>2.4 mg</td>
<td>20 %</td>
</tr>
<tr>
<td>Vitamin K1</td>
<td>41 mcg</td>
<td>55 %</td>
</tr>
<tr>
<td>Vitamin B8</td>
<td>7.9 mcg</td>
<td>15.8 %</td>
</tr>
<tr>
<td>Vitamin B9</td>
<td>69 mcg</td>
<td>34.5 %</td>
</tr>
<tr>
<td>Calcium</td>
<td>257 mg</td>
<td>32.1 %</td>
</tr>
<tr>
<td>Iron</td>
<td>6.5 mg</td>
<td>46.4 %</td>
</tr>
<tr>
<td>Lutein</td>
<td>8 mg</td>
<td>-</td>
</tr>
</tbody>
</table>

* Recommended daily dose
LRD and APEF

- 30 years of supply of concentrated extract in countries that cannot produce or cannot produce enough by themselves
- 25 T/yr sold
- 2 500 000 of 10g dosis distributed

LRD supplies for associations

Associacion franco Mexicana Suiza y Belga de Beneficencia

Dispensais Emmaüs

La Santé par les aliments

Soynica

Enfant du monde

A successful development on our historical market:

30 years of proven benefits on malnourished populations
Clinical trials have been conducted and have confirmed the benefits and harmlessness of alfalfa protein concentrate.

The observational data from the field shows an improvement in the subjects' nutritional condition with LUZIXINE:

- Correction of anemia due to iron deficiencies
- Acceleration of height and weight growth in children and teenagers
- Decrease in respiratory infections and chronic diarrhea.

Clinical trials sources:
1. A nutritional trial evaluating the efficacy and tolerance of using alfalfa leaf extract as a dietary supplement in malnourished children. Study conducted in Peru by Professor Eric Bertin over 12 months from March 2004 to March 2005. (study available only in French language, title translated from French)
4. A nutritional trial evaluating the efficacy and tolerance of using alfalfa leaf extract as a dietary supplement in chronically malnourished children. Study conducted in Congo by Professor Eric Bertin over 84 days from November 2004 to February 2005. (study available only in French language, title translated from French)
Development of various applications

- **Humanitarian:**
  - Asociacion franco mexicana suiza y belga de beneficencia i.a.p : range

- **Soynica**
The trust to go further: willingness to supply all consumers

- A long process before the launch on the European market

**2000's:** Alfalfa has proved its worth in developing countries but is still unknown and under-exploited in developed countries for mass consumption, while it can serve to rebalance the contributions in developed countries often too rich in energy and to complement the contributions of populations with specific needs.

<table>
<thead>
<tr>
<th>Year</th>
<th>Event</th>
</tr>
</thead>
<tbody>
<tr>
<td>2006</td>
<td>LRD has to submit a Novel Food file to be approved by the EC as CAE was not consume before 1997.</td>
</tr>
<tr>
<td>2009</td>
<td>Obtention of the Novel Food Agreement, first step to the launch of the product in Europe.</td>
</tr>
<tr>
<td>Till 2016</td>
<td>Works with ARD to characterize optimal conditions of production, DLUO, Packaging offers.</td>
</tr>
<tr>
<td>2016</td>
<td>First production batch according food supplement regulation and optimized in terms of process and product quality.</td>
</tr>
</tbody>
</table>

**Commission Decision**

of 13 October 2009

authorising the placing on the market of a leaf extract from Lucerne (Medicago sativa) as novel food or novel food ingredient under Regulation (EC) No 258/97 of the European Parliament and of the Council.
Creation of the brand Luzixine

2014: Registration of the brand name Luzixine® for the LRD Food CAE

French production
Gathered into cooperatives organization, the french alfalfa drying industry offer a traceability 100% guarantee

An eco-responsible manufacturing process according to the concept of total exploitation of the plant through the valorisation of co-products
Being visible on its market

- 2 years of Vitafoods Europe participation
A support for demanding nutritional needs

For nutritional formulation of food supplements and superfoods

VEGANS/VEGETARIANS
- Proteins
- Omega 3
- Calcium
- Iron
- Vitamin K

ELDERLY
- Proteins
- Omega 3
- Calcium
- Vitamin K

PREGNANT WOMEN
- Vitamin B9 (Folates)
- Calcium
- Iron
- Vitamin K
- Lutein and vitamin A

ATHLETES
- Proteins
- Vitamin B9 (Folates)
- Vitamin E
- Vitamin K
- Iron
Two outlets: food supplements and superfoods

- Exemple of positionning

  - Capsules for nail and hair vitality
  - Grinded into fine powder by one of our distributor to sell as ingredient for bulks, energy and sport bars, diet food, smoothies...
Current business situation and negotiations in 2019
Next steps

To go further in the development

- Extension of use Novel Food to satisfy future European protein demand
- Communication campaign on the product
- Adaptation of factories for bigger production volumes

Main difficulties

- Evolution of the regulation of food supplements that get stricter and stricter
- Important investments
- Regulation of countries worldwide: long and costly process of registration
Conclusion

- Whatever the remaining obstacles to go through, **the french alfalfa drying industry is now ready to face tomorrow challenges** being able to provide quality alfalfa proteins but also vitamins, minerals and ω3 to human beings in a sustainable way.

- The last issue remain the regulation to extend the commercialization in Europe on the food ingredient market for mass consumption.

**Process alimentaire – June 2018**

**Luzerne, la nouvelle source de protéines durables**

La recherche de protéines végétales alternatives bat son plein. Luzerne – Recherche Développement met en avant son extrait qui combine intérêt nutritionnel et écologique.

Dans un monde en pleine transition alimentaire, la diversité des sources de protéines est au cœur des préoccupations. Présent sur un stand pour la 1ère fois au Vitafoods, Luzerne – Recherche Développement (L-RD) a
THANK YOU FOR YOUR ATTENTION

Interested?
We are looking for distributors

Any questions?
Feel free to contact me

Valentine CLAUDON
Development Manager
Mobile: +33 7 88 76 26 30
E-mail: valentine.claudon@luzerne-rd.fr

L.R.D – Comptexe Agricole du Mont Bernard
Route de Suippes
EP149 – 51008 Châlons en Champagne

www.luzixine.fr