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We have endeavoured to appraise you of the value adding opportunities in the conversion of agricultural residues into pulp/paper and have provided some detail in the submission attached.

Currently however, with the release in the last two weeks of an Initial Public Offer Prospectus, the time required to give full justice to this topic has not been available. If you feel it warranted, in the weeks to come, we could provide additional specific data as required.

We are keen to see your inquiry be comprehensive and successful. To that end and to the extent that agricultural residues are available for value adding we stand ready to assist.

David Paul
Technical Director

**Evaluation of the current state of value adding in Australia
and how that compares internationally**

Arisa Ltd. has as its business objective 'utilisation of waste agricultural material for conversion into value added products in a commercially viable and environmentally benign manner'. Our company's initial project is for a bleached market pulp mill based on wheat straw to be located at Horsham, Victoria. It will be Australia's first and only market pulp mill and the only mill based solely on non-wood fibre. The process is proven and no harmful emissions occur.

The project was last month awarded Major Project Facilitation status by the Federal Minister for Industry, Science & Resources, Senator Minchin in recognition of the unique and valuable features of the project to Australia.

At the moment fund raising for this \$96 million regional pulp mill is underway. Construction is expected to commence early next year with commissioning anticipated in early 2002.

The longer term plans for the company involve the establishment of further pulp mills located elsewhere in Australia and utilising cereal straw and other non-wood fibres (cotton, rice straw, bagasse, kenaf, flax and hemp, etc) depending on the respective commercial opportunities.

Arisa is an Australian company with headquarters in Adelaide, South Australia. It is a single purpose, public unlisted company that has been in operation for nearly 10 years. The staff of Arisa, currently four in number, has spent this period identifying potential sites and processes as well as operational scale options and the rural impacts. Over \$2 million has been expended in this study.

The purpose of this communication is to advise how this organisation views the non-wood pulping prospects both here and overseas.

Non-wood fibre pulping generally utilises waste agricultural material but occasionally fibrous crops are grown specifically for the textile or pulp/paper industries. Worldwide the majority of non-wood pulp is straw and most of the straw pulping is undertaken in India and China. Around 10% of all pulp produced in the world is based on non-wood sources.

See Table 1 overleaf.

Table 1 World Pulp Production for 1997 (million Tonnes)

Wood Pulp Production	160
Non-Wood Pulp Production	18
Fillers and Recycled Fibre	121
Total, Paper and Board	299

Source: PPI July 1998, Jaakke Poyry Magazine January 1999

The use of natural fibres for papermaking is as old as papermaking itself. Approximately 200 years ago it was discovered that the production of paper from wood was not only possible but preferable - as long as trees were plentiful (cheap). This situation has changed completely in the recent past with increasing volumes of timber resource being locked away and secondary fibre resources (waste paper/board) reaching economic limits of supply.

As a result non-wood fibres today are the centre of an increasing level of interest. This is true in Europe where industrial crops are replacing food crops as the EU progressively remove crop subsidies. This is true too in other western economies where falling agricultural crop prices drive the farming community to look for ways to supplement their income. Finally pulp/paper companies themselves are starting to review their situation as the potential effect of an expected fibre scarcity in 10- 15 years time begins to colour their thinking.

Most of the potential for a straw based pulp industry lies with Australia, Canada and USA. In all these countries, many feasibility studies have been commissioned but as far as we are aware the Arisa proposal is the most advanced.

Straw based pulp mills have been built in Italy, Spain, Hungary, Romania, Turkey, Syria, Egypt, Pakistan, India and China. The technology that Arisa has chosen after lengthy and careful analysis was the proven soda pulping technology of the Naco International group in Italy. Similar technology is under test in Canada. Fescue grass is being tested in the USA which otherwise maintains a watching brief.

Currently all the Australian pulp production is based on wood or recycled fibre. Woodchipping of public and private forests produces around half of Australia's pulp, the balance being derived from ONP/OCC sources. Less than half the woodchips produced however are utilised in Australian value adding industry of pulp manufacture and panel board production. Around 55% of Australia's woodchip harvest is exported.

Table 2 Australia Woodchip Production 1997/1998 (million tonnes)

End use	
Domestic Pulp/Panelboard	3.5
Export	4.3

Source: ABARE: Forest Products Statistics

Table 3

Australian Pulp Production 97/98
Wood resourced pulp (thousands Tonnes)

	Softwood	Hardwood
Public Forest	588	657
Private Forest	815	176
Sawmill Residue	373	128
Totals	1176	961

Source: APPITA Pulp/Paper Statistics 1/99

When we consider value adding opportunities we should ask the question, "to what extent can agricultural residues replace wood chips?".

The degree of value adding in the case of straw stubble being processed into bleached market pulp is set out below.

Straw: Moisture = 10%
 Yield = 38% for manufacturing bleached market pulp
 \$/raw tonne = \$10 (source: baling contractors)
therefore \$/bone dry tonne (BDT) of pulp
 = \$34.50/BDT pulp.

Pulp: Moisture 10%
 Long term average price = US\$650/air dry tonne (ADT)
 = A\$1000/ADT
 = A\$1025/BDT pulp.

Thus value adding = 30 times.

Woodchip: Moisture = 50%
 Yield = 50%
 \$/raw tonne = \$80
therefore \$/bone dry tonne of pulp
 = \$320/BDT of pulp.

Summary:

4 tonnes of raw woodchip converts to 1 BDT of pulp for which the fibre cost is \$320/BDT of pulp. Similarly 3.4 tonne of raw straw converts to 1 BDT of pulp for which the fibre cost is \$34.50/BDT of pulp. Hence the value adding in the production of pulp in the conversion of straw is 9 times greater than for wood chip.

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