



# Saltland Pastures

Association (Inc.)

for productive saltland

[www.crcsalinity.com.au/spa](http://www.crcsalinity.com.au/spa)

Issue 21, June 2008

## Aquaponics - new opportunity for saltland?

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East Hyden

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## SPA Update

*Glenice Batchelor, SPA Chair*

It's been a busy couple of months in the chair with a number of highlights.

### International Salinity Forum in Adelaide

In April I attended the International Salinity Forum in Adelaide to present a paper and proudly listened to Sally Phelan (Project Manager) and Michael Lloyd co-present a paper on SPA's behalf. The paper outlined the Saltland Revegetation Initiative which encompasses the National Landcare Programme funded Grower Support Network project in the Avon and South West catchments, as well as Avon Catchment Council's saltbush and saline pastures subsidy project.

The SPA committee were very pleased to source funding through Land Water and Wool to sponsor four farmer members from around the state to attend the Forum -thanks to the generosity of Land, Water and Wool. It was great to meet Bernadette Cashmore (East Hyden), Andrew Lee (Dumbleyung), John Pickford (Woodanilling) and of course to allow Michael Lloyd to attend and co-present. All have assured me it was a valuable and enjoyable learning experience. Andrew Lee will give a grower's perspective of the conference in the September newsletter.



Land Water and Wool sponsored SPA members to attend the International Salinity forum. From left: John Pickford (Woodanilling), Michael Lloyd (Pingaring), Bernadette Cashmore (East Hyden), Mike Wagg (Land Water and Wool), Glenice Batchelor (SPA chair) and Hayley Norman (CSIRO Livestock Industries)

Tony York from Tammin was a key presenter and rounded out the amazing four days by sharing his family's experiences using saline pastures in their farming system with the international audience. WA was strongly represented at the conference and reflected the amount of excellent research and researchers we are so lucky to have here in the west such as Hayley Norman (recently featured on Landline), Ed Barrett-Lennard, Di Mayberry and Phil Nichols.

### Pathways to Adoption Workshop

Last year a very successful Pathways to Adoption workshop was held at Katanning and it was wonderful to be able to bring the workshop to the eastern wheatbelt and host it at Tammin/Kellerberrin. Check out the John Powell update in this newsletter. For me, the workshop reinforced the role of saltland pastures in our farming systems.

### SPA Staff Update

Project Manager Sally Phelan's contract will be ending in June and Sally will return to the Department of Agriculture and Food (DAFWA) based at the Bunbury office. Sally will still be working for SPA for three days a week to the end of September, which will help finalise current projects and assist with the transition to new projects and handover to new staff. Our thanks go to DAFWA for their ongoing assistance and support.

The six Grower Support Network advisors will continue to assist growers in the Avon and South West catchments to the end of the year.

### National Landcare Programme Sustainable Practices funding

SPA have submitted a joint funding submission with Evergreen Farming and WA Lucerne Growers which looks at increasing adoption of perennials across the landscape, regions and rainfall zones. If successful, the project will evaluate the benefits of the three groups joining to form one WA perennials-focused organisation. Whether or not an amalgamation occurs, the project will strengthen partnerships and provide some great on-ground outcomes for WA farmers. Member consultation and support will be an integral part of exploring future partnerships.

### Regional NRM groups

SPA has been maintaining regular contact with regional groups to see how the change of Federal government is affecting their futures. We remain committed to working within the regional framework wherever possible and that the regional process is important to ensure that local needs are recognised and where possible supported.

### SPA Committee

We will be meeting this month and as always we welcome any input to any of our committee. This year we are focussed on future planning and project development and continuing to meet the needs of our members.

On a personal note, I am very proud to have been acknowledged as the WA Landcare Professional at the State Landcare awards. The opportunity to work with like-minded individuals and groups is something that all of us appreciate and I'd like to thank everyone who has worked with me over the years.



*You are invited to the following:*

**Albany Seminar ‘Developing commercial opportunities for tree and perennial crops on saline lands in the Great Southern’  
Thursday 26<sup>th</sup> June 2008 8.30am – 12.30am**

**At the Department of Agriculture and Food Seminar room, Albany Highway**

Green Skills, in association with Timber 2020, South Coast NRM, Forest Products Commission and the CRC for Future Farm Industries, is running a major seminar in the Albany region on Thursday 26<sup>th</sup> June 2008.

When: Thursday 26<sup>th</sup> June 8.30 – 12.30

Focus: Developing new tree and perennial plant commercial opportunities for saline lands. This seminar is being run under the Green Skills’ Dryland Farm Forestry program funded through South Coast NRM. The idea follows on from a regular annual program of seminars we have coordinated since 2001. This seminar is aimed at farmers pioneering new approaches to tree cropping and adoption of perennials on saline lands, agency and plantation sector reps, NRM reps, and interested members of the general public.

Morning Tea and Lunch provided

Cost: \$30 Corporate and Organisational \$20 individual \$10 concession (includes GST)

For further information contact Basil Schur 9848 1019 Email [BSchur@greenskills.org.au](mailto:BSchur@greenskills.org.au)

**SPA Fact Sheets**

Direct Seeding, Old man saltbush, River saltbush, Wavy leaf saltbush.

For copies, contact Sally Phelan on 0427 902 126 or [spa@agric.wa.gov.au](mailto:spa@agric.wa.gov.au).



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## Biodynamic farming helps saltland recovery

Biodynamic farming is about much more than just 'not applying chemicals'. It is an involved process of feeding the soil to increase soil biota and organic matter, thus producing rich humus. Conventional agriculture fertilizes to directly feed plants, whereas in biodynamics, special preparations are applied to feed the soil, and healthy soil produces healthy plants, which in turn grows healthy animals. Although biological farming techniques like organics and biodynamics have become popular with health conscious consumers in recent times, John and Bernadette Cashmore at 'Nyonger' east of Hyden have been farming biologically since 1992. And the benefits have not just been on their fresh soil. John and Bernadette have also noticed a significant improvement in their saline landscapes.

John and Bernadette Cashmore farm a 4,800 acre property 40km east of Hyden, just one property away from the rabbit proof fence. John has always worked on the farm, gradually taking over from his father during the 1980's. It was noticed that conventional farming methods were degrading the property resulting in the rapid expansion of salt pans and scalds. While investigating biodynamics, John and Bernadette were advised that it may take time to bring the farm back, but with persistence soil improvements have been excellent and the Cashmores gained Demeter certification in 1995 – just three years after introducing the “nature enhanced” organic method on the farm.

John and Bernadette will grow 900 acres of barley this year, with the rest in pasture. When clovers reach a high level in the pasture, the soil is ready for a cropping phase. If a crop is not grown at this stage, grasses will predominate next season. The level of clovers in the pasture guides the rotation, as opposed to specific phases. Paddocks are grazed hard before a crop to reduce weeds, which are now not a big problem. John and Bernadette have recently moved into growing and marketing 'Cashmore Meats' certified biodynamic lamb. With low wool prices in recent years, the Cashmores have been slowly moving to Dorper sheep and are finding them to be more resilient.

In 2000, John and Bernadette compared DOLA aerial photos taken of their saline land in late October in 1994 and 1999. In 1994, the saline site had received three application of the

biodynamic spray BD 500, and in 1999 the same site had received eight sprayings. What John and Bernadette observed was a significant improvement in the condition of the saltland. While two dry years preceded the 1994 photos, five wet years preceded the 1999 photos. It would be expected that the wet seasons would have increased the salinity; however the opposite was observed (photos 1 and 2). In comparison, the conventional farm next door was showing an increase in the area of salinity (photos 3 and 4).

John and Bernadette believe the dramatic improvement on the saline sites is due to the soil structure benefits of applying BD 500. Compacted soil tends to create capillary action, drawing salts to the soil surface and creating scalds. Research from La Trobe University at the Cashmore's has shown an improvement in soil structure across the farm, and fluffy, friable soils with rich humus have been observed. This re-creation of soil structure and top soil has acted like mulch creating a freshening of the soils surface and allowing plant growth.

John and Bernadette are this year participating in the SPA Avon Saltbush planting scheme. They will be growing old man and river saltbush seedlings, and are also keen to try some direct seeding to see whether the biodynamic methods assist with a successful establishment. It is hoped that the water use from the saltbushes will complement the soil structure improvements observed from biodynamic methods.

For more information visit <http://members.bordernet.com.au/~cashmore3>



Before and After. Photo 1, left, saltland in 1994 after three BD 500 sprays. Photo 2, right, the same area of saltland in 1999. The area of salinity is greatly reduced after eight sprays of BD 500.



Photo 3

Conventional versus biodynamic, 1994. Area of saltland circled in red for biodynamic, and blue for conventional.



Yellow - Biodynamic

Pink - Conventional

Photo 4

Conventional versus biodynamic, 1999. Area of saltland increased in conventional paddocks (blue) but decreased in biodynamic paddock (red).





# Salt Water Aquaponics: growing fish and saltland pasture together

A trial has begun in the wheatbelt on a property near Goomalling that may totally change the way farmers view their salt affected land. On this cereal/sheep property an area that has been severely affected by salinity has been allocated to carry out the trial.

The company Aqua Farms Research and Development (AFRD) have dug several trenches, each of about a million litres into the watertable where the salinity is two thirds to full sea water ( 20 – 35 ppt). AFRD are trialing a system to farm marine fish such as Mulloway, Pink Snapper, Black Bream and salt tolerant rainbow trout in intensive cage systems. The system uses air to move water through the cage (airlifts) and therefore greatly increases the stocking density (see photos 3 and 4).



Photos 1 and 2. Above: excavating the trench, and below the trench ready for cages.



Photo 3 (above) fish cages in trenches and photo 4 (below) airlifts that allow for increased stocking densities.



The key to get this system to work involves taking the solid waste (fish faeces and uneaten feed) and the dissolved waste (Ammonia) and lift the water into a nutrient trench that runs parallel to the trench where the fish are growing. In the nutrient trench, salt tolerant plants that can also tolerate waterlogging will be used to strip the excess nutrients (mainly nitrogen and phosphate) before the water flows back into the fish trench. The plants would be cropped regularly and then fed to sheep and cattle. Thus the farmer is not only growing marine fish (which due to overfishing world wide are becoming more valuable) but also growing fodder for stock.





Photo 5: Planting *Juncus kraussii* in the nutrient trench.

The beauty of this system is that it is virtually drought proof. As can be seen from the photos the trench has been initially planted out with a salt sedge (*Juncus kraussii*) but other species will be trialed such as Tall wheat grass (*Thinopyrum ponticum*) and Puccinellia (*Puccinellia ciliata*). It is hopeful that a new species being trialed by the University of WA, a highly palatable legume called *Lotus tenuis*, will also be tested at Goomalling. By passing the waste water through the nutrient trench the effluent water is scrubbed of the excess nitrogen and phosphorus before returning to the fish trench.



Photo 6: Salt tolerant plants in the nutrient trench filter excess nitrogen and phosphorus.

It is envisaged that the fish will take six months to get to market size (greater than 500 grams) thus two crops per year will be possible.



Photo 7: The growing pond and nutrient trench.

Photo 8: Airlifted water entering the nutrient trench.



Besides being a great example of farm diversification the objectives of AFRD are to also produce a system that is farmer friendly. The system is designed with the busy schedule of growers in mind where there is little time available to look after fish. The Goomalling project has automatic feeders that would require the farmer to fill up the feeders once a week. The water quality is monitored by electronic probes so that if there is a power failure and the oxygen levels fall below a critical point, then a diesel generator kicks in and starts up a back up blower to aerate the water in the fish cages. The air and water temperature are also being monitored and these can be checked from the farmer's home via a relay system connected to his telephone line and home computer. The trial will continue throughout the winter and the fish are expected to be harvested in late October.

For more information contact Tony Bart on mob. 0430514069 or email [tonyabalone@primusonline.com.au](mailto:tonyabalone@primusonline.com.au)

## Comparing salt across the country

Need for a standardised system and terminology to classify saltland has been apparent for many years, and many different groups and geographical areas have their own local versions. A new Australia-wide system has been proposed by Ed Barrett-Lennard from the Department of Agriculture and Food and colleagues at the Future Farm Industries CRC, which was presented to the International Salinity Forum in Adelaide in April.

Ed said that use of a standardised classification system would mean that any work on the salinity tolerance of potential fodder plants could be easily incorporated into the saltland capability assessment, regardless of where the research was undertaken. Results could also be readily extrapolated across States for use by extension workers and land managers seeking the most profitable and sustainable plant options.

Different terms are currently used in different States for the same levels of salinity as measured by Electrical Conductivity. For example,  $EC_e$  levels of 8-16 dS/m (WE WOULD TEND TO USE 80-160 MILLSIEMENS PER METRE BUT ED PREFERS DECISIEMENS. CONVERT IF YOU PREFER.) are often described as “very saline” in WA but “high” in South Australia. Then levels above 16 dS/m are called “extreme” in WA, “severe” in SA, while the same term “severe” can be used for 14-35 dS/m in Victoria or more than 14 dS/m by the Murray-Darling Basin Commission.

In 2005, Mary-Jane Rogers from Victoria proposed a standardised classification that ranged from non-saline (with  $EC_e$  values of 0-2 dS/m) to highly saline (more than

8 dS/m) but this level has little appeal to halophyte agronomists who deal with many soils with  $EC_e$  greater than 16 dS/m, Ed noted.

Land with salinity around 20 dS/m would be capable of supporting halophytic grasses such as tall wheatgrass and puccinellia but other country at 60-100 dS/m would only manage samphire, he said. These were all well off the Rogers scale which stopped at 8 dS/m.

Ed, with colleagues Sarita Jane Bennett and Tim Colmer, argues that there is need for an Australia-wide soil salinity classification that is easy to use, compatible with State classifications where possible, and that links soil salinity to plant indicators. Their proposal is summarised in the table below. One of its great strengths is the mathematical simplicity: each class has double the  $EC_e$  value (Electrical Conductivity of saturation extract) of the one before it. This means that the range for *moderate* salinity (4-8 dS/m) is twice that of *low* (2-4 dS/m) and half as much as *high* (8-16 dS/m).

Values are more complicated when  $EC_{1:5}$  (Electrical Conductivity in 1:5 extract) is used and need to be varied depending on soil texture.  $EC_{1:5}$  values are easy to measure and are widely used in the field.

Dr Barrett-Lennard would welcome any comment or debate about the merits of the proposed system. He can be contacted on telephone (08) 6488 1506 or email [egbarrettlennard@agric.wa.gov.au](mailto:egbarrettlennard@agric.wa.gov.au)

**Table 1. Suggested Australian classification system for categorisation of soil salinity**

Suggested term	$EC_e$ range (dS/m)	$EC_{1:5}$ range (based on conversions of George and Wren 1985)			Effect on plants
		For sands	For loams	For clays	
Non-saline	0-2	0-0.14	0-0.18	0-0.25	Negligible
Low salinity	2-4	0.15-0.28	0.19-0.36	0.26-0.50	Decreased growth in sensitive crops such as beans
Moderate salinity	4-8	0.29-0.57	0.37-0.72	0.51-1.00	Decreased growth in most crops
High salinity	8-16	0.58-1.14	0.73-1.45	1.01-2.00	Only tolerant non-halophytes can tolerate
Severe salinity	16-32	1.15-2.28	1.46-2.90	2.01-4.00	Decreased growth of most halophytes
Extreme salinity	>32	>2.29	>2.91	>4.01	Some halophytes die, most have decreased growth



## Successful Pathways to Adoption workshop held at Tammin April 2

The recent Path to Adoption workshop at Tammin featured ‘headline’ technologies refined by CRC Salinity for whole farm and landscape water management in the eastern wheatbelt of WA, including lucerne phase farming, saltland pastures, and oil mallees. Day one of the workshop started with excellent presentations on the technologies from lead CRC researchers **Perry Dolling**, **John Bartle** and **Ed Barrett-Lennard**. Participants then learned more about the practical side of the technologies on four farms. Growers **Simon York**, **Gavin Morgan**, **Rod Forsyth** and **Murray Clement** talked about why they adopted the technologies, the challenges in adopting them, and whether they actually delivered anticipated benefits.



Grower Gavin Morgan used 2m deep soil pits to demonstrate the effect of lucerne in preserving his future grain yields. Gavin’s site at Kellerberrin is part of the Catchment Demonstration Initiative in the Avon region.

There was lively discussion and networking all day (and night!) amongst the diverse group of participants who had been invited to the workshop. Time will tell, but the Tammin workshop may have catalysed a *regional advisers network* for the eastern wheatbelt. Table group sessions inside on day two saw growers, CRC researchers and next users having in-depth (and sometimes loud!) discussions about the merits of the technologies. They also put forward their ‘big ideas’ for what should happen next to increase adoption of the technologies.

The table groups were capably chaired by **Sally Phelan**, Project Manager with the Saltland Pastures Association, **Dan Ferguson**, Project Delivery Manager with Avon Catchment Council, and **Tim Scanlon**, Development Officer with DAFWA Merredin. ‘Big ideas’ to come out of the Tammin workshop were:

- promote lucerne to croppers as a tool to preserve cropping yields and land value, instead of promoting it as part of lucerne-livestock systems to address waterlogging and salinity;
- promote saltbush as part of normal farm and landscape management, rather than something you do when land is no longer useful for anything else;
- establish regional partnerships between the Oil Mallee Association, State agencies and Shires, for coordinated oil mallee industry development.

**More specifically for Saltland Pastures, workshop participants agreed that:**

*Advantages of saltland pastures are that they:*

Are an option for 100% croppers in blocks and alleys for agistment or sheep trading; free up better quality land for cereals and create more efficient use of stubbles; allow different management of different classes of sheep; provide more resilience to climate change; provide Vitamin E, especially in northern areas; are fully tax deductible and increase the capital value of land asset; can knock down woody Old Man Saltbush (OMS) with rollers – it will re-shoot; take advantage of sub-surface irrigation; are productive with/without understorey; proper fit depends on design taking into account water, fences, cropland, saltland.

*Drivers for adoption of saltland pastures are:*

Favourable economics (on moderately salt-affected land); fear of lost production and reduced aesthetics; local NRM people.

*Barriers to adoption of saltland pastures are:*

Unfavourable economics (on severely salt-affected land); high grain prices (even B class land can yield 6 bags or 1 tonne/ha of wheat); need to be more flexible in applying our recipes; not being at crop updates; not sure where to go for advice; lack of NRM advisers with skills, knowledge and confidence; lack of education and training opportunities for NRMOs; high staff turnover amongst NRMOs and agribusiness advisers; supply of seed/seedlings; post-planting management; lack of farmer measurement - they tend to be reactive, eg only acting after observing scalds (when its too late to put more productive options in).



Dan Mudford from North Central CMA in Victoria makes a point during a table group session on day 2. North Central CMA is a Partner in the FFI CRC.

Several members of the FFI CRC Adoption & Commercialisation Consultative Panel also participated in the workshop. Representatives of Qualdata, which is monitoring and evaluating the impact of the CRC’s adoption and commercialisation activities, also attended. The workshop was organised by **John Powell**, FFI CRC Adoption Manager, with local on-ground support from **John Borger**, DAFWA Northam, and **Glenice Batchelor**, Project Manager of the Catchment Demonstration Initiative at Doodlakine/Kellerberrin and SPA Chairperson. For further information contact John Powell (02) 6226 5298 [jpowell@optimalicm.net.au](mailto:jpowell@optimalicm.net.au)

# Is there a place for saltbush in an all-cropping situation?

*Michael Lloyd, 'Bundilla', Lake Grace*

High grain prices and recent dry seasons have seen some growers moving away from livestock to 100% cropping. This begs the question of whether saltbush can play a role in a total cropping system, or whether other salinity management options would be more beneficial. Lake Grace farmer and saltbush champion Michael Lloyd takes a look at the pros and cons of saltbush for the 100% cropper.

This question was asked recently at a CRC workshop, and the initial response was to talk about the possibility of using saltbush mixed with stubbles for agistment. It is true that there may be an opportunity to use saltbush and stubbles for agistment on some farms, but in many situations where the farmer has decided to go out of stock, the stock infrastructure may have deteriorated to such a degree that agistment is not viable. In addition to this, some farmers see more value in the stubble being retained as mulch and they regard the returns from agistment as being pretty minor.

So it does beg the question above – is there a place for saltbush on a non-stock farm? To answer this, perhaps we should first look at the role of saltbush in the farming system and in particular, its current role in a stock- or mixed-farm enterprise.

In the past, saltbush has been seen as a good fodder source and terms like “living haystack” have often been used. In addition to this, saltbush was seen as the main fodder source, with the under-storey of grass and clovers, hay or stubble as the supplement to mitigate the high salt levels and provide energy to balance the protein.

With observations over the last few years, many of us are now seeing saltbush in a different light. At densities of up to 1000 plants per hectare, we are experiencing watertable drawdown of between one and two metres, which in turn has seen a massive increase in the amount of annual clovers and grasses growing, right up to and in amongst the saltbush. The combination of the energy in the annuals and the protein in the saltbush, together with the high levels of Vitamin E in the saltbush, make for an almost perfect fodder for stock. So maybe the saltbush's primary purpose is not to provide the “base” fodder, but to lower the watertable enough to allow for large quantities of annual under-storey to be grown for energy. Perhaps in this case, the saltbush becomes the supplement!

But what about the all cropping farm with no stock? Principally, it is the ability of the saltbush to use groundwater and lower the watertable that will benefit the cropping system.

With rising watertables a feature of our wheatbelt, particularly in the broad valley floors, there is a desperate need to introduce more perennials into the farming systems, including cropping systems. Generally people have looked to phase farming with lucerne, or alley farming with eucalypts, often oil mallees, to be that perennial.

Let's see how these options stack up.

## Phase Farming - Lucerne

Generally, when lucerne is introduced into a phased farming cropping system, it is with 3 years of lucerne followed by 4 years of cropping, or a similar rotation. This means that in any one year, there would be 43% of the area in lucerne and 57% in crop – not the most attractive scenario for someone with no stock! In addition to this, the phase system increases the risks in a variable or changing climate. With no perennials in a cropping paddock for 4 years, high rainfall years or even high rainfall events increase the chance of rising watertables with no perennial to soak up the excess. Also, in years of low rainfall in the crop year following lucerne, there is the risk of lower crop yields due to the drying effect of the lucerne in the perennial phase and lower rainfall in that crop year. While there is a place for lucerne in a mixed farming system as opposed to all-cropping, there is also an increased risk in the event of climate change and severe climate conditions – both wet and dry.



Phase farming with lucerne increases water use



### Alley Farming - Oil Mallees and other eucalypts

Another option of introducing perennials into a cropping system is to use alley farming – in this case oil mallees or other eucalypts. While there may be some argument about the amount of water use by eucalypts in non-saline situations, when the concentration of salt in the groundwater rises to 20 dS/m (about 35% of sea water), their growth and therefore water use will decline. As well, eucalypts are renowned for “robbing” soil adjacent to the rows of nutrients and water, leaving crops near the shrubs stunted or withered or the soil bare - ask any farmer with a solitary salmon gum in the centre of a paddock! Of course, this will vary according to species. *Eucalyptus sargentii* (Salt River gum) can have bare areas up to 3m either side of the row of trees in the alley. In spite of this, alleys of eucalypts may provide watertable control (provided the groundwater is not too saline), will use summer rainfall and provide erosion control.



Alleys of oil mallees with cropping in the inter-row

### Alley Farming - Saltbush

As with trees and other shrubs in alleys, saltbush will use summer rainfall and provide erosion control. It will also lower watertables, even where saline groundwater is present, although its growth may slow in the presence of extremely highly saline groundwater. However, it does have one big benefit over eucalypts – the annuals will

grow right up to the base of the saltbush. In fact, there is some anecdotal evidence that the grasses grow better in amongst the saltbush, and certainly seem to benefit from the shelter of the alley system.



Alleys of saltbush with legume understorey

So to ask the question again – Is there a place for saltbush in an all-cropping system?

When the evidence is considered, the answer must be YES!

Alleys of saltbush will help with watertable control, especially at moderate levels of groundwater salinity. Some farmers have expressed concern about losing up to 20% of their cropping land by planting alleys. If saltbush is used for the perennial in the alley system and it is introduced before the rising saline groundwater is affecting crop production, it will provide long-term protection against salinity, protection against wind and water erosion and protection from the damaging effects of strong winds. Crops will be able to be grown right up to the saltbush.

But then the next question that must be asked of a farmer with land at risk from rising saline groundwater is:

**“Do you want to crop 100% of this paddock for the next 5 to 10 years before it becomes saline, or do you want to crop 80% of it for the next 50 or so years?”**

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Annual membership fee is \$55.00  
Cheque/money orders made payable to Saltland Pastures Association Inc.

A tax invoice will be issued on payment.